3 4
Nat
57661
aqx
33-36

THE

# AMERICAN NATURALIST,

AN ILLUSTRATED MAGAZINE

OF

# NATURAL HISTORY.

EDITED BY
A. S. PACKARD AND EDWARD D. COPE.

ASSOCIATE EDITORS:
W. N. LOCKINGTON, DEP. OF GEOGRAPHY AND TRAVELS.
PROF. H. CARVILL LEWIS, DEPARTMENT OF MINERALOGY.
PROF. C. E. BESSEY, DEPARTMENT OF BOTANY.
PROF. O. T. MASON, DEPARTMENT OF ANTHROPOLOGY.
PROF. HENRY SEWALL, DEPARTMENT OF PHYSIOLOGY.
DR. C. O. WHITMAN, DEPARTMENT OF MICROSCOPY.

VOLUME XVIII.

PHILADELPHIA:
PRESS OF McCALLA & STAVELY,
NOS. 237 AND 239 DOCK STREET.
1884.

Copyrighted 1884,
By McCalla & Stavely,
For the Proprietors.

6736

# CONTENTS.


Disadvantages of the upright Position. [Illustrated.] . . . . . *S. V. Clevenger* . . . . . 1
The Mammalian Fauna of the Australian Desert . . . . . *Edward B. Sanger* . . . . . 9
Observations on the Pulsating Organs in the Legs of certain Hemiptera. [Illustrated.] . . . . . *Wm. A. Locy* . . . . . 13
On the Character and Function of the Epiglottis in the Bull-Snake (Pityophis). [Illustrated.] . . . . . *Charles A. White* . . . . . 19
The Carolina Wren; a Year of its Life. . . . . *Charles C. Abbott* . . . . . 21
The Batrachia of the Permian period of North America. [Illustrated.] . . . . . *E. D. Cope* . . . . . 26
An Account of the War Customs of the Osages. [Illustrated.] . *J. Owen Dorsey* . . . . . 113
Notes on some apparently undescribed Infusoria from Putrid Waters. [Illustrated.] . . . . . *Alfred C. Stokes* . . . . . 133
Colonial Organisms . . . . . *Charles Morris* . . . . . 140, 240
Review of the Progress of North American Batrachology in the years 1880–1883 . . . . . *W. N. Lockington* . . . . . 149
Wood Notes and Nest Hunting. . . . . *Horace Hunt* . . . . . 155
The Crab Parasite, Sacculina. [Illustrated.] . . . . . *Carl F. Gissler* . . . . . 225
Men Ignorant of Fire . . . . . *Titian R. Peale* . . . . . 229
Grave Mounds in North Carolina and East Tennessee. [Illustrated.] . . . . . *Cyrus Thomas* . . . . . 232
Anatomy and Physiology of the Family Nepidæ. [Illustrated.] . *William A. Locy* . . . . . 250, 353
The Creodonta. [Illustrated.] . . . . . *E. D. Cope* . . . . . 255, 344, 478
The Exhalation of Ozone by Flowering Plants . . . . . *J. M. Anders* . . . . . 337, 470
Topographical Phenomena in Indiana. [Illustrated.] . . . . . *John T. Campbell* . . . . . 367
Renumeration of the Spinal Nerves and Reconstruction of the Plexuses in the Human Subject . . . . . *Elliott Coues* . . . . . 379
A Review of the Progress of North American Invertebrate Palæontology for 1883 . . . . . *J. B. Marcou* . . . . . 385
The Mezquit . . . . . *V. Havard* . . . . . 451
The Larval Theory of the Origin of Cellular Tissue . . . . . *Alpheus Hyatt* . . . . . 460
The Naturalist Brazilian Expedition. (Paper III. — Sao Joao do Monte Negro.) . . . . . *Herbert H. Smith* . . . . 464, 578
A walk through the Natural History Museum at Florence. . . . *James S. Lippincott* . . . . . 485
Construction of Ancient Mexican Terra-Cotta Pitch-Pipes and Flageolets. [Illustrated.] . . . . . *H. T. Cresson* . . . . . 498
The Theory of a Glacial Dam at Cincinnati and its Verification. *G. Frederick Wright* . . . . 563
The Structure of the Tracheæ of Insects. [Illustrated.] . . . . *G. Macloskie* . . . . . 567
Agricultural Botany. [Illustrated.] . . . . . *E. Lewis Sturtevant* . . . . . 573
On the Evidence that the Earth's Interior is Solid. . . . . *M. E. Wadsworth* . . 587, 678, 767
Vestiges of Glacial Man in Minnesota . . . . . *Miss Franc E. Babbitt* . . 594, 697
The Genesis of Crystalline Rocks . . . . . *T. Sterry Hunt* . . . . . 605
Notes on a New Infusorian. [Illustrated.] . . . . . *Alfred C. Stokes* . . . . . 659
The Theory of Sex and Sexual Genesis. . . . . *C. M. Hollingsworth* . . . 667, 778
The Tertiary Marsupialia. [Illustrated.] . . . . . *E. D. Cope* . . . . . 686
The Glaciated Area of North America. [Illustrated.] . . . . . *G. Frederick Wright* . . . . 755
On the Shedding of the claws in the Ptarmigan and Allied Birds. *Leonhard Stejneger* . . . . . 774
On the Constitution of some Appendages of the Mollusca . . . . *W. H. Dall* . . . . . 776
The Condylarthra. [Illustrated.] . . . . . *E. D. Cope* . . . . . 790, 892
Notes on a Nevada Shell (Pyrgula nevadensis). [Illustrated.] . . *R. E. Call and C. E. Beecher* 851
Aspects of the Body in Vertebrates and Arthropods. [Illustrated.] *A. S. Packard* . . . . . 855

The Northernmost Inhabitants of the Earth. An Ethnographic Sketch [Illustrated.] . . . . . *Emil Bessels* . . . . . 861
Opinions upon Clay Stones and Concretions. [Illustrated.] . . . *L. P. Gratacap* . . . . . 882
The North American Geasters. [Illustrated.] . . . . . *A. P. Morgan* . . . . . 963
On Catagenesis . . . . . *E. D. Cope* . . . . . 970
The Crystalline Rocks of the Northwest . . . . . *N. H. Winchell* . . . . . 984
Man in the Tertiaries . . . . . *Edward S. Morse* . . . . . 1001
Recent Studies of the Spade-foot Toad. [Illustrated.] . . . . . *Charles C. Abbott* . . . . . 1075
Notices of some new Parasitic Infusoria. [Illustrated.] . . . . . *Alfred C. Stokes* . . . . . 1081
Growth, its Conditions and Variations . . . . . *Charles Morris* . . . . 1086, 1210
Dr. D. E. Salmon's Claims respecting the discovery of the Germ of Swine-plague . . . . . *H. J. Detmers* . . . . . 1101
The Segmental Sense-organs of the Leech. [Illustrated.] . . . *C. O. Whitman* . . . . . 1104
The Amblypoda. [Illustrated.] . . . . . *E. D. Cope* . . . . . 1110, 1192
Rock Inscriptions in Brazil. [Illustrated.] . . . . . *John C. Branner* . . . . . 1187
The Relation of Color to Flavor in Fruits and Vegetables . . . . *Emmett S. Goff* . . . . . 1203
Preliminary Note on some Fossil Fishes recently discovered in the Silurian Rocks of North America . . . . . *E. W. Claypole* . . . . . 1222
The Harp Seal a permanent Resident in the St. Lawrence. . . . *C. Hart Merriam* . . . . . 1227

EDITORS' TABLE.

Pessimism and Hedonism, 40; The Society of Naturalists of the Eastern United States, 160; The Government Appropriations, 161; The Law and Insanity, 267; Origin of our Aryan ancestors, 269; Biology at the Johns Hopkins University, 392; Natural Science in Philadelphia, 393; Growth in American academies, 510; Life and Death, 607; Zoology in the National Parks, 708; An International Scientific Association, 805; The tercentenary celebration of the University of Edinburgh, 806; Innovations in Nomenclature, 906; Engravings for science work in America, 908; Scientific contracts, 1031; The American Association for the Advancement of Science in 1884, 1121; The Press and Science, 1231; Original Research in Philadelphia, 1234.

RECENT LITERATURE.

Hatton and Harvey's Newfoundland [Illustrated], 41; Wright's Animal Life, 45; Christ's Flora of Switzerland and its origin, 46; Buckley's Winners in Life's Race [Illustrated], 47; Baume's, Odontological Researches, 50; Recent Books and Pamphlets, 50; Mission Scientifique au Mexique, Recherches Zoologiques, Trois partie, Rech. sur les Reptiles et les Batrachiens, 162; Chamberlain's Geology of Winconsin, 163; U. S. Fish Commissioner's Report for 1880, 164; Adolph's Morphology of the Wings of Hymenoptera, 165; The Standard Natural History [Illustrated], 166; Davis and Rice's North American Batrachia and Reptilia found east of the Mississippi river, 168; On the Formation of the Egg and the Blastoderm in the viviparous Aphis, 168; Recent Books and Pamphlets, 171; Meinert's Anatomy of the Centipede's Head, 270; Leydig's Researches in Anatomy and Histology, 272; Sternberg's Photomicrographs and how to make them, 273; Miss Buckley's Life and her Children, 273; Hansen's Structure of the Mouth Parts of Diptera, 274; Where did Life begin? 275; Geological Report of Indiana for 1882, 275; Martin's Human Body, 275; Recent Books and Pamphlets, 276; Ryder's Observations on Embryo Fishes, 395; White's Geology of the Susquehanna River region, 398; Second Report of the U. S. Geological Survey [Illustrated], 400; Hopley's Snakes, Curiosities and Wonders of Serpent Life, 402; Bulletin of the Buffalo Society of Natural Sciences, 403; The Standard Natural History [Illustrated], 403; Recent Books and Pamphlets, 404; Dutton's Tertiary History of the Grand Canon district [Illustrated], 511; Garman's North American Reptiles and Batrachians, 513; Galton's Record of Family Faculties, 515; Balbiani's Lectures on the Sporozoa, 516; Report of the Geological and Natural History Survey of Canada for 1880-'81-'82, 517; Recent Books and Pamphlets, 518; Brauer's Studies on Dipterous Larvæ, 609; DeCandolle's Origin of Cultivated Plants, 611; Jackson's Vegetable Technology, 614; Smith's Dictionary of Economic Plants, 614; Recent Books and Pamphlets, 614; The Zoological Record for 1882, 709; Collins's Mineralogy, 710; Third Report of the U. S. Entomological Commission, 711; The Coal and Iron counties of North Carolina, 712; Zittel's Hand-book of Palæontology, 712; Brehm's Thierleben, 712; Recent Books and Pamphlets, 712; The Duke of Argyll's Unity of Nature, 807; The Standard Natural History [Illustrated], 808; Recent Books and Pamphlets, 809; Biogen, by Dr. Coues, 908; Barrois' Palæozoic Formations of Asturias and of Galicia, 909; Friedlander's Bibliotheca Historico Naturalis et Mathematica, 910; Bessel's Smith Sound and its Exploration, 911: Leche's Anatomy of the Pelvic region in the Insectivora, 912; Gau-

dry's "Les Enchainements du Monde Animal," 912; Report of the U. S. Commissioner of Fish and Fisheries for 1881, 912; The Woods and Timbers of North Carolina, 913; A Botanist's Vacation, 913; Recent Books and Pamphlets, 913; Notes on the Birds observed during a summer cruise in the Gulf of St. Lawrence, by William Brewster, 1014; Seebohm's Siberia in Asia, 1017; Winchell's World-Life, 1021; Dobson's Monograph of the Insectivora, 1024; Coues' Key to North American Birds, 1025; Manual of the Mosses of North America, 1026; Recent Books and Pamphlets, 1027; Forbes' Second Report of the Noxious Insects of Illinois, 1122; Catalogue of Aquatic Mammals of the United States, 1123; Winchell's Report on the Geology of Minnesota, 1124; The Standard Natural History [Illustrated], 1125; Geological Survey of Alabama, 1127; Recent Books and Pamphlets, 1127; Kraepelin's Proboscis of Musca [Illustrated], 1234; Ober's Travels in Mexico [Illustrated], 1244; Briefer Course in Botany, 1247; The People's Cyclopedia, 1248; Recent Books and Pamphlets, 1249.

GENERAL NOTES.

*Geography and Travels.*—America, 52: A Visit to Stanley's Stations in Africa, 53; Asia and the Indian archipelago, 55; Geographical Notes, 56; Asia and the Asiatic Islands, 172; The Southern Chinese, 173; Anam, or Upper Cochin China, 174; Africa, 175; Geographical News, 176; Africa: The Congo, from its mouth to Bolobo, 277; The Kuilu, 278; M. Revoil's Journey in the South Somali country, 279: Geographical Notes, 279; Africa, 406; Asia, 407; Asia, 519; Africa, 520; America, 521; The Arctic, 522; The Archipelago of Cape Horn, 522; Geographical Notes, 523; Africa, 713; The Pacific islands, 714; Geographical Notes, 716; Africa, 811; The Arctic, 812; The Pacific Islands, 813; America—The Greely Expedition, 915; Africa—Madagascar, 916, The Aruwini, 917: Asia—The Nan-schan Mountains, 917, The Thousand Caves, 918, The Pamir, 918, Central Arabia, 918; The Aral, 919; China, 919; America: Results of the Greely expedition, 1029; Geysers of the Yellowstone, 1030; Africa: The Bahr-el-Ghazal, The French on the Congo, The Upper Congo, 1030; Asia: The Amu-Daria or Oxus, Mr. Carles's Journey in Corea, Arabia Petræa, 1031: Europe, 1033; Australia, 1033; Geographical Notes, 1033; Asia; Recent Travels in Arabia, Sir Charles W. Wilson's Notes in Anatolia, 1128; Geographical Notes, 1132: Asia; Mr. Graham's Ascents of Himalayan peaks, 1250; Asiatic Notes, 1251; African Notes, 1252; America: The work of the Greely expedition, 1253.

*Geology and Palæontology.*—The Power of Motion in Crinoid Stems [Illustrated], 57; The Loup Fork beds on the Gila river, 58; On new Lemuroids from the Puerco formation, 59; The Destruction of the Volcano of Krakatoa [Illustrated], 62; Hunting for lost Glaciers with a Microscope, 62; Geological Notes, 62; Results of the Deep-sea work of the "Talisman," 177; The Eocene Fauna of Patagonia, 178: Schlosser on Anoplotherium, 181; Elevated Coral Reefs of Cuba, 181; The History of the Oreodontidæ, 280; Professor Owen on Fossil Mammals, 282; Fritsch on the Permian Fauna of Bohemia, 282; Filhol on Eocene Lemuroids, 283; The Mineral Products of the United States for 1882–3, 283; Geological Notes, 285; T. S. Hunt on Cambrian rocks of North America, 409; The Geology of Algiers; Formations below the Tertiary, 411; The Skull of a still living Shark of the Coal Measures, 412; Lesquereux on Cretaceous and Tertiary Plants, 413; Geological Notes, 415; The Mastodons of North America, 524; Marsh on Diplodocus, 526; Lithology of some Cordillerian Volcanoes, 526; Heat and Cold in Geology, 528; Geological Notes, 528; On the Fossil Flora of Greenland, 615; Geological Notes, 616; Lydekker on Extinct Mammalia of India, 717; Geological Notes, 718; The Choristodera, 815; The Formation of Statuary Marble, 817; The genus Pleuracanthus [Illustrated], 818; Origin of Coral Reefs, 818; Geological News, 819; The Protoconch of Cephalopoda, 919; Fossil Man in Mexico, 920; Geology of Algiers, 920; The Carboniferous Flora of Rhode Island, 921; Geological News, 923; Observations on the Phylogeny of the Artiodactyla derived from American fossils, 1034; Eruption of Krakatoa, 1036: The Seventh Volume of the Geological Survey of Illinois, 1037; Geological Notes, 1838; Blanford on Homotaxis of Geologic Periods, 1134; The Glaciers of New Zealand, 1136; The Origin of the Mammalia, 1136; Beecher's Ceratiocaridæ of Pennsylvania, 1137; Niagara Fossils, 1138; Geological Notes, 1139; The Structure of the Columella auris in Clepsydrops leptocephalus [Illustrated], 1253; Note on the Phylogeny of the Vertebrata, 1255; The Permanence of Ocean Beds, 1257; Systematic Position of Lepidodendron, Sigillaria and Stigmaria, 1257; Geological Notes, 1257.

*Mineralogy.*—American Gems and Precious Stones, 63; A new Mineral, 65; Gems from the Himalaya mountains, 65; Descloizite from Mexico, 65; Gold in North Carolina, 66; Groddeckite, a new Zeolite, 182; Herderite from Maine, 182; Recent Meteorites, 182; The Feldspars, 183; Pseudo-symmetry, 184; Mineralogical Notes, 184; An Interesting Mineral from Canada, 416; Cubic Spinel, 417; The Origin of the Diamond, 418; Uranothorite, 418; Topaz in Nevadite

from Colorado, 419; Tellur-sulphur, 419; American Gems, 419; Mineralogical Notes, 419; Native Iron from New Jersey, 618; Flexible Sandstone from Pennsylvania, 619; Some Maine Minerals, 619 · Natural Nitrous Oxide, or Laughing Gas, 619; Tin from North Carolina, 620; Swedish Minerals, 620; Haydenite, 622; New Minerals, 924; Flexible Sandstone, 927; Mineralogical Notes, 927; Allanite, Apatite and Tysonite Crystals, 1038; Curious Gold Crystals, 1039; Alkalies in Beryl, 1039; New Mineral Analyses, 1039; Lollingite and other Minerals from Colorado, 1039; Evansite, 1040; Tin from North Carolina, 1040; Nickel from Nevada, 1041; Vanadinite, 1041; New Minerals, 1141; Photography as applied to Minerals, 1143; Szaboite, 1144; Mineralogical Notes, 1144; Leucite from Lower California, 1259; Enargite from Montana, 1260; Lazulite from Georgia, 1260; Mineralogical Notes, 1261.

*Botany.*—An Interesting Botanic Relic of the District of Columbia, 66; Hybridism in Spirogyra [Illustrated], 67; Large Fungi, 68; New Florida Fungi, II, 69; Gray's Contributions to North American Botany, 70; A Suggestion in regard to the Publication of new Species, 71; Remarkable Fungus Growth, 72; Erratum, 73; Botanical Notes, 73; Popular Botany Again, 186; Genera Pyrenomycetum Schematice delineata, 187; New Florida Fungi, III, 188; Laboratory Helps, 190; A new edition of Cooke's Hand-book of the British Fungi, 190; Botanical Notes, 190; The August Flora of the Dismal Swamp and vicinity, 288; Laboratory Notes, 290; Allen's Characeæ Americanæ Exsiccatæ, 290; Botanical Notes, 291; Glands on a Grass [Illustrated], 420; Sexuality in Zygnemaceæ, 421; Some Recent Botanical Advances, 422; Botany in a Medical Course, 423; Obituary, 423; Botanical Notes, 423; An enormous Puff-ball, 530; Notes on Fungi, 530; Cross-fertilization in Lobelia, &c., 531; Water from Eucalyptus roots, 532; Sturtevant's Studies of Maize, 532; Curtiss' seventh fascicle of North American plants, 533; Another Botany, 533; Botanical Notes, 534; An Observation of the Fertilization of the Germ Cell of Equisetum arvense [Illustrated], 622; Sisyrinchium bermudiana, 623; Bailey's Catalogue of N. A. Carices, 626; Grant Allen's Colors of Flowers, 626; Flowers and their Pedigrees, 627; North American Fungi, 628; The Flora of Buffalo, 628; Ensilage Mould, 628; A Parasitic Cupfungus, 628; Red Clover in New Zealand, 629; Botanical Notes, 629; Notes on Fungi, 721; Structure and Physiology of the Passion Flower (Passiflora lutea) [Illustrated], 722; Conspectus generum Discomycetum hucusque cognitorum Disposuit, by P. A. Saccardo, 723; The Flower of the Glade Mallow (Napæa dioica) [Illustrated], 724; Botany at the approaching meeting of the A. A. A. S., 725; Erratum 725; Botanical Notes, 725; Additional Notes on Passion Flowers [Illustrated], 820; A new Species of Moss [Illustrated], 821; The Fertilization of Pedicularis canadensis, 822; The Fertilization of Giant Hyssop (Lophanthus nepetoides) [Illustrated], 928; The Injuriousness of Porcupine Grass, 929; Structure of the Fruit of Porcupine Grass [Illustrated], 930; An abnormal Fuchsia blossom, 931; Botanical Notes, 932; Structure, Development and Distribution of Stomata in Equisetum arvense [Illustrated], 1041; The Desmids of the United States, 1042; Botanical Notes, 1044; Self-planting of Seeds of Porcupine Grass, 1145; The adventitious Inflorescence of Cuscuta glomerata [Illustrated], 1145; Botany in the A. A. A. S., 1147; New Species of North American Fungi, 1147; Botanical Notes, 1148; Notes on the Structure of the Flowers of Zygadenus glaucus, Nutt. [Illustrated], 1262; Concerning the manner in which some Seeds of Grasses bury themselves in the Soil, 1262; New Species of North American Fungi (continued), 1264; The Death of George Bentham, 1265; Notice, 1265; Botanical Notes, 1265.

*Entomology.*—The genus Colias, 74; Habits of Blaps and Embaphion, 76; Larval Habits of the Dipterous family Dexidæ, 76; Northern Localities for Southern Butterflies, 77; Insect-life among Spider Eggs, 77; Aletia xylina in the North, 77; Aquatic Spiders, 78; The Phylloxera in Sandy Soil, 78; Osage Orange *vs.* Mulberry for the Silkworm, 78; The Chinch-bug in New York State, 79; Bacterial Disease of the imported Cabbage-worm, 80; Entomological Notes, 80; Flight of Insects, 191; Antennary Rods of Vanessa io, 191; Rudimentary Wings in Beetles 192; Sitaris and its Transformations [Illustrated], 193; Variation in the Arctias, 193; Affinities of Palæocampa, 194; The Hessian Fly, 194; Egg-laying Habits of the Egg-parasite of the Canker worm, 292; Paired Sexual Outlets in Insects, 293; The Larch worm [Illustrated], 293; The Hemlock Gelechia, 296; Food-plants of the Army-worm, 297; Salivary and Olfactory Organs of Bees, 298; Entomological Notes, 299; The Spruce-bud Tortrix [Illustrated], 424; Nest of the Pseudo-Scorpion [Illustrated], 427; Entomological News, 427; Gills of Insect Larvæ, 534; The closed Poison Glands of Caterpillars, 535; Thoracic Musculature of Insects, 535; Respiratory Center of Insects, 536; Mouth-parts of the Hemiptera, 536; Chlorophyll in Aphides, 537; Ayers' Development of Œcanthus niveus and its parasite, Teleas, 537; A possible Sense Organ in Campodea [Illustrated], 540; Lucilia macellaria infesting Man, 540; Entomological Notes, 542; Eaton's Monograph of the May-flies, Part I, 630; Notes on Moths, 632; The Bird-louse (Dermaleichus

pici-pubescentis), 633; Entomological Notes, 633; The Transformations of Nola, 726; An African Social Caterpillar, 727; Antennæ of a Beetle used as Defensive Weapons, 727; Polymorphism of Male Lucanidæ, 728; Report of the Entomologist of the U. S. Department of Agriculture for 1883, 728; Entomological Notes, 729; Habits of an aquatic Pyralid Caterpillar [Illustrated], 824; Notes on Salt-water Insects, No. III (Illustrated], 826; Entomological Notes, 828; Life-histories of some Geometrid Moths, 933; Bombus plundering different species of Plants, 936; Examining the Heads of Insects, Spiders, &c., alive, 936; Anatomy and Function of the Bee's Tongue., 937; Entomological Notes, 937; Life-history of Lochmæus tessella, 1044; Transformations of Caripeta angustiorata, 1045; The Limbs of Insects, 1046; Poison Glands in the Skin of the Cecropia Caterpillar, 1046; Malpighian Vessels of Lepidoptera, 1047; Transmission, Preservation and Mounting of Aphides, 1047; Mode of Oviposition of the common longicorn Pine Borer (Monohammus confusor), 1149; Egg-laying Habits of the Maple-tree Borer, 1151; Palmen's paired outlets of the sexual organs of Insects, 1152; The Nature of the so-called "Liver" in the Arachnids, 1153; The Systematic Position of the Embiidæ, 1154; Entomological Notes, 1155; Great Swarms of a Pseudo-neuropterous Insect in Japan, 1266; The Larval Stages of Mamestra picta, 1266; The Bees, Wasps, etc., of Labrador, 1267; Dangers from the Excrement of Flies, 1267; Origin of Bee's Cells, 1268; Entomological Notes, 1269.

*Zoölogy.*—Owen on the Aspects of the Body in Vertebrates and Invertebrates, 81; Forbes' Studies of the Food of Animals, 82; Symbiosis in the Animal Kingdom, 83; Collecting and Preparing Infusoria, 84; How the Boring Sponge penetrates Limestone and Shells, 85; Polymorphism and Parthenogenesis in Mites, 87; Water collecting Apparatus for Mites, 87; Spawning of the Axolotl, 88; Why Salamanders are not Eaten by Frogs. 88; Food of Snakes, 88; California Long-billed Marsh Wren, 89; Zoological Notes, 89; Notes on American Medusæ [Illustrated], 195; Life in the Naples Aquaria, 199; New Human Cestode (Ligula mansoni), 199; Hydromedusa without digestive Organs, 199; Blue Coloring Matter of Rhizostoma, 199; An Oyster on a Crab, 200; Molting of Limulus, 200; Sograff's Embryology of the Chilopod Myriopods, 201; New Cave Arachnids [Illustrated], 202; Ventral Repugnatorial Organ in Centipedes (Geophilus), 204; Albrecht on the Morphological Value of the Mandibular Articulation, 205; Characters of Human Femora, 206; Zoological Notes, 206; Notes on Medusæ [Illustrated], 300; A new Pelagic Larva [Illustrated], 305; Barn Owls in Missouri, 309; Notes on the Red-wing Blackbird, 309; Migration of North American Birds, 310; Color-markings of Mammals, 313; Zoological Notes 314; Trematode Parasites in American Crayfish [Illustrated], 429; Pterolichus falciger Megnin, observed in the United States [Illustrated], 430; On the Morphology of the "Lateral Rods" of the Ophiuroid Pluteus, 431; Plateau's researches on the absolute force of the muscles of Bivalves, 432; Three new families of Fishes added to the deep-sea Fauna in a year, 433; Zoological Notes, 434; Atavism considered as a Conservative Agent in a State of Nature, 542; A transparent Cave Sponge, 546; New Worm with a remarkable Nervous System, 546; New and Remarkable Pentastomum in the Air-sacs of a Gull, 547; The Side Organs of Gastrostomus, 547; Zoological Notes, 548; Occurrence of Chlorophyll in Animals, 634; Vital Manifestations of the Sponges, 635; Pedal Glands of Mollusca, 636; Suckers of Cephalopods, 637; Researches on the Isopoda, 637; Commensalism between a Fish and a Medusa, 638; Snakes in Nebraska, 638; The Pelvisternum of Edentates, 639; Scales, Feathers and Hairs, 640; Dr. Coues' Renumeration of the Spinal Nerves, 641; Zoological Notes, 642; The Life-history of Thalassema, 730; Anatomy of the Stomach of Stalk-eyed Crustacea, 731; The Crayfish not Dimorphous, 731; The Glottis of Snakes, 732; Abnormal Deer Antlers from Texas [Illustrated], 733; Forsyth Major on the true Pigs, 738; Zoological Notes, 738; A new Infusorian belonging to the genus Vorticella [Illustrated], 829; A new Species of Infusorian [Illustrated], 830; Life-history of the Hypopus stage of certain Mites, 832; Does the Crow Blackbird eat Crayfish? 832; Zoological Results of the "Romanche" expedition to Cape Horn, 833; Zoological Notes, 853; Structure of the Otocysts of Worms, 938; On the Pelagic Fauna of the Swiss Lakes, 939; The "Man-eater Shark," Carcharodon carcharias [Illustrated], 940; Water-pores of the Lamellibranch Foot, 941; Two species of Manatee in Brazil, 941; Abnormal Food of Cats, 941; Zoological Notes, 943; The Origin of Fresh-water Faunas, a study of Evolution, 1050; Shells of Anticosti, 1051; Gill on the Habits of Fishes, 1052; Hibernation of the Gray Ground Squirrel, 1054; The Varying Hare, 1055; Food of Cats, 1056; On the remarkable Skull of an Idiot twenty-one years old, 1056; Zoological News, 1057; New Classification of the Rotifers, 1155; The Nature of Echinoderms, 1156; Destruction of Dog-fish by an isopod Crustacean, 1157; Are the "Chimneys" of burrowing Crayfish designed? 1157; The Crustacea of the Talisman Expedition, 1158; Races and Hybrids among the Salmonidæ, 1158; Acceleration in Deer Antlers, 1160; Habits of the Panther, 1160; Zoological Notes, 1163; The Molluscan Body-cavity, 1271; Note on the Pelvis in Birds and Dinosaurs, 1273; Thomasomys, a new subgeneric type of Hesperomys, 1275; An

Egg-laying Mammal, 1275; The American Badger in Ohio, 1276; Phases of Kangaroo Life [Illustrated], 1276; Habits of the Gorilla, 1277; Zoological Notes, 1278.

*Physiology.*—Digestion without a Stomach, 208; Measurements of the Depth of Sleep, 209; Experiments upon the Heart of the Dog with reference to the maximum volume of Blood sent out by the left ventricle in a single beat, and the influence of variations in venous pressure, arterial pressure and pulse-rate upon the work done by the Heart, by W. H. Howell and F. Donaldson, Jr., 210; Localization of Function in the Brain, 436; Writing with the Voice, 438; The Physiology of the Carbohydrates, 642; Human Physiology, by Henry Power, F.R.C.S., 643; The Fibrin-ferment, 643; Coloring Matters of Bile, 740; Connection between Physiological Action and Chemical Constitution of Drugs, 835; The Accelerator and Inhibitory Nerves of the Heart of cold-blooded Animals, 936; The time taken by the Blood in making the circuit of the Body, 837; Biological Action of the Salts contained in Sea Water on the existence of Marine Animals, 945; A new Explanation of the Process of Inflammation, 948; The Cholera Bacillus, 1059; The Physiology of Rumination, 1164; Circulation of Blood Corpuscles, 1165; Does Sugar occur in healthy Urine, 1280; Why Albumen does not occur in normal Urine, 1280 Localization of Function in the Brain, 1281.

*Psychology.*—Intelligence of the Cat, 95; Sense Discrimination, 97; A Pair of Catastrophes, 97; Poetry in Dreams, 98; Intelligence in a Pointer, 211; A Labor-saving Fish-hawk [Illustrated] 212; The Permanence of the Domestic Instinct in the Cat, 213; Note on Parturition, 214; The Diseases of the Will, 317; Sagacity of the Horse, 318; Individual Idiosyncrasy, 318; Domestication of Animals, 318, Gregarious and Slavish Instincts, 438; Teaching Animals to Converse, 441; Peter's Search for Home, another Cat story, 550; The Ten Commandments, 552; Poetry in Dreams, 552; The Practical Types of Mind, 644; Curious Companionship of the Coyote and Badger, 644; Darwin's opinions on Instinct, 741; Dreaming in Verse, 744; The Nature of Instinct, 838; Intelligence in the Bear, 839; Singular Friendship between two Birds, 949; Filia Affection in a Horse, 951; Romanes' Mental Evolution in Animals, 1061; Do Labrador Dogs Bark? 1063; How a Bear catches Fish, 1063; Cunning as a Fox, 1064; Emotional Faculties of Animals, 1166; The Measurement of Human Faculty, 1170; The Psychical Relation of Man to Animals, 1282; More concerning Cats' Food, 1284.

*Anthropology.*—Chinese Coins in British Columbia, 98; Fuegian Ethnology, 99; The Atlantis 99; The German Anthropological Society, 100; The Western Scientist, 100; The Great Index Catalogue, 100; Indian Names of Water-courses, 101; The Kanakas of New Caledonia, 101; French Ethnology, 102; The Congress of Americanists, 103; The Indian Census, 215; British Anthropology, 216; German Anthropology, 217; Weather Proverbs, 319; Canonicus Memorial, 320; Aboriginal American Authors, 320; Mr. Bancroft's Library, 321; The Anthropological Society of Washington, 321; The American Antiquarian, 322; The Palæolithic Man's Beads, 322; Population of China, 323; Notices, 323; The Grand Traverse Region, 442; The Folk-lore of Shakespeare, 443; Eskimo and Indian Pictographs, 444; Megalithic Monuments in France, 444; The Anthropological Society of Lyon, 445; The Northern Frontier of China, 553; The Peopling of the Earth, 553; The Tribes of Egyptian Sudan, 553; The Color of the Eyes and Hair, 554; Stone Implements from Minnesota, 555; The Astor Library, 645; The British Association Anthropometric Committee, 646; Anthropology at the National Capital, 648; Mr. Bancroft's New Volumes, 744; The Mound-Builders, 745; On the Athabasca district of the Canadian Northwest Territory, 746; Uniform Craniometry, 839; Ethnology of British Guiana, 840; The Catlin Collection, 842; Bureau of Ethnology, 952; Archæological Circular, 955; The American Antiquarian, 955; PeabodyMuseum, 956; Anthropology in France, 1065; Races of the Philippines, 1066; Psychical Research, 1067; Okadaira Shell Mound, 1067; Physiological Inquiries, 1067; The Annals of Chimalpahin, 1170; The Board of Indian Commissioners, 1171; The Health Report of Washington, 1171; The Indian Office Report, 1172; The Indian Museum at Calcutta 1173; A new Journal, 1173; Anthropology in France, 1173; Further Discoveries of Perforated Crania in Michigan, 1174; The Aruba language and the Papiamento jargon, 1176; Association Notes, 1286; A Correction, 1288.

*Microscopy.*—Methods of Preventing the Rolling of Microtomic Sections, 106; Schulze's Section-smoother, 107; Mayer's Method of Fixing Microscopical Sections, 218, Perchloride of Iron as a reagent for preserving delicate marine animals, 218; The preparation of Dry Injection-masses, 219; Pure Carminic Acid for Coloring Microscopical Preparations, 324; Structure of Secretory Cells and their Changes in Secretion, 327; Proceedings of the American Society of Microscopists, 329; "The Microscopical Bulletin," 329; Collodion as a Fixative for Microscop-

ical Sections, 445; Born's Method of Reconstructing Objects from Microscopic Sections, 446; Methods of Studying the so-called Liver of the Crustacea, 556; A new Section Flattener [Illustrated], 557; Perenyi's Fluid, 558; Methods of Investigating Animal Cells, 650; Pfitzer's method of Coloring and Hardening at the same time, 651; Filtering Reagent Bottle [Illustrated], 651; Notes on the use of the Freezing Microtome, 653; Sections of Diatoms, 747; Killing Hydroid Zoophytes and Polyzoa with the Tentacles extended, 749; Mounting Fluid for Algæ, 749; Methods of Imbedding [Illustrated], 842; A Simple Section Smoother [Illustrated], 844; On the use of Vaseline to prevent the loss of Alcohol from Specimen Jars, 845; Mounting and Photographing Sections of Central Nervous System of Reptiles and Batrachians, 956; A Starch Injection Mass, 958; Mr. Iijima's Methods of preparing Planarians and their Eggs, 1068; The Connective Substance in the Hirudinea, 1070; Myrtillus, a new Dye for animal and vegetable Tissues, 1177; A new Section-flattener [Illustrated], 1178; The Distomian Brood-sac or Sporocyst [Illustrated], 1179; The development of the Jaws of Branchiobdella and a method of isolating them, 1180; Imbedding Apparatus [Illustrated], 1289; Treatment of the Ova and Embryos of the Aphides, 1290; The Organization of the Echinorhynchi, 1291.

SCIENTIFIC NEWS, 108, 220, 330, 448, 559, 654, 750, 845, 960, 1071, 1181, 1292.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Biological Society of Washington, 111; New York Academy of Sciences, 412; Boston Society of Natural History, 112; Appalachian Mountain Club, 112, American Geographical Society, 112; Proceedings of the Philadelphia Academy of Natural Sciences, 222; Appalachian Mountain Club, 223; Biological Society of Washington, 223; New York Academy of Sciences, 223; Boston Society of Natural History, 223; American Geographical Society, 223; The Society of Naturalists of the Eastern United States, 224; American Philosophical Soc., 332; Proceedings Philadelphia Academy Natural Sciences, 334; Biological Soc. of Washington, 336; New York Academy of Sciences, 336; American Geographical Soc., 336; Boston Soc. of Natural History, 336; Appalachian Mountain Club, 336; Natural Science Association of Staten Island, 336; Biological Soc. of Washington, 450; New York Academy of Sciences, 450; Boston Soc. of Natural History, 450; American Geographical Soc., 450; Biological Soc. of Washington, 560; New York Academy of Sciences, 561; Boston Society of Natural History, 561; Appalachian Mountain Club, 561; Philadelphia Academy of Natural Sciences, 562; National Academy of Sciences, 656; Biological Society of Washington, 657; New York Academy of Sciences, 657; Boston Society of Natural History, 657; Appalachian Mountain Club, 658; American Geographical Society, 658. Philadelphia Academy of Natural Sciences, 658; Biological Society of Washington, 752; Boston Society of Natural History, 752; New York Academy of Sciences, 753; Appalachian Mountain Club, 753; American Philosophical Society, 753; Natural Science Association of Staten Island, 754; Biological Society of Washington, 849; New York Academy of Sciences, 849; Appalachian Mountain Club, 849; Ottawa Field Naturalists' Club, 849; American Philosophical Society, 849; Philadelphia Academy of Natural Sciences, 850; American Association for Advancement of Science, 1182; Academy of Natural Sciences Philadelphia, 1295; National Academy of Sciences, 1296; Appalachian Mountain Club, 1296; Newton Natural History Society, 1297; New York Academy of Sciences, 1297; Boston Society of Natural History, 1297; Proceedings of the American Philosophical Society, 1297; Illinois State Natural History Society, 1298.

THE

# AMERICAN NATURALIST.

VOL. XVIII.—*JANUARY*, 1884.—No. 1.

## DISADVANTAGES OF THE UPRIGHT POSITION.

BY S. V. CLEVENGER, M.D.

THE immediate and remote causes of things have been and will be sought by thinkers who are not afraid to follow wherever facts lead them. The doctrine that there is no effect without an antecedent cause, has met with fierce opposition from those who saw that the logical conclusions of correlated facts, such as are presented by Darwin, tended to the overthrow of puerile legends they believed in, and who were content to imagine that everything was causeless, or at best originated in some inscrutable way. The Arab, upon having the sidereal motions explained to him, said, "You trouble yourself greatly about things not intended for you to know. Even though what you tell me is true, the Koran leads us to believe otherwise. Mohammed taught us sufficient, and his followers can torture you out of your rationalism. Forbear your heretical facts!"

The mechanical nature of things animate is as old in theory as Democritus, 500 B. C.; and Giordano Bruno, in A. D. 1600, for having amplified the Democritic idea, was burned at the stake. Kant granted a mechanical cosmogony, but in organic nature claimed *causæ finales*. The battle of *causæ efficientes* was fully won by Galileo, Copernicus, Kepler, Newton, Herschel, Laplace, etc., so far as the inanimate universe was concerned, but the mechanical conception of that which pertains to living things was hinted at by Aristotle. Geoffrey de St. Hilaire contended against Cuvier for the mutability of species and the monistic theory.

Treviranus, Oken, Goethe, Lamarck, and in our day, Darwin, Haeckel, Huxley, have carried on the warfare. Herbert Spencer advanced a mechanical physiology and morphology. His has carried the conception into histology, and Cope into palæontology. The unity of the laws which control organic and inorganic nature are to-day fully recognized by those who stand in the front rank of investigators and thinkers, but not until completer text-books from the new standpoint shall have found their way into the hands of medical students and naturalists generally, will common recognition of the success of the mechanical idea be obtained.

Assuredly the teleological is a very lazy way of thinking. It amounts to taking things for granted as so, because they are so. It bars all inquiry, stops all investigation, and hands us bound hand and foot to ignorance and superstition.

Mechanical influences, such as impacts and strains, permanently altering animal organs, have been discussed by Professor E. D. Cope in the AMERICAN NATURALIST, in articles entitled, Origin of the Foot Structures of Ungulates, April, 1881; Effects of Impacts and Strains on the Feet of Mammalia, July, 1881; by Alpheus Hyatt, Transformations of Planorbis at Steinheim, with Remarks on the Effects of Gravity upon the forms of Shells and Animals, June, 1882. In articles published in the January and February, 1881, numbers, I attempted a disquisition upon physical influences in their relations to comparative neurology, and in the July, 1881, number of the AMERICAN NATURALIST, On the Origin and Descent of the Human Brain, pointed out some hitherto neglected mechanical factors in the development of the organ of the mind and its osseous envelope.

While engaged in anatomical studies, the idea that there was a definite reason for everything, and that we might some day discover the reasons for many things not now known, was ever present to my mind. I could get half lights and glimpses of causes from hints in Henle, Holden, or Sharpey and Quain, and fancied I saw matters clearly enough in some particulars, only to be confused by contradictory experiences subsequently.

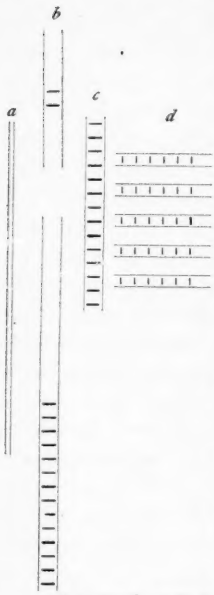
There seemed to be a definite enough law in the formation of valves in the veins, for instance, but every student was compelled to learn the location of these valves by arbitrary exercise of the memory. I think every student will conclude at the end of this

paper that it is easy enough *now* to remember which veins are valved and which are not. Let me present the subject just as it perplexed me at first. Nothing could be simpler from the teleological standpoint, than that we should have valves in the veins of the arms and legs to assist the return of blood to the heart against gravitation, but what earthly use has a man for valves in the intercostal veins which carry blood almost horizontally backward to the azygos veins? When recumbent these valves are an actual detriment to the free flow of blood. The inferior thyroid veins which drop their blood into the innominate are obstructed by valves at their junction. Two pairs of valves are situated in the external jugular and another pair in the internal jugular, but in recognition of their uselessness they do not prevent regurgitation of blood nor liquids from passing upwards.

An apparent anomaly exists in the absence of valves from parts where they are most needed, such as in the venæ cavæ, spinal, iliac, hæmorrhoidal and portal. The azygos veins have imperfect valves.

Place man upon "all fours" and the law governing the presence and absence of valves is at once apparent, applicable, so far as I have been able to ascertain, to all quadrupedal and quadrumanous animals: *Dorsad veins are valved; cephalad, ventrad and caudad veins have no valves.* The apparent exceptions to this rule, I think, can be disposed of by considering the jugular valves as obsolescing, rendered rudimentary in man by the erect head, which in the lemur stage depended. The rudimentary azygos valves may be a recent creation, and an explanation of their presence may be found in the mutability of the cardinal system. The single Eustachian valve, being large in the fœtus, has a phylogenetic value. In this connection I would call attention to my mention, in *Science* (New York), June 25, 1881, of the probable branchial origin of the thyroid and thymus glands. There are many reasons for believing these bodies to be rudimentary gills.

The only reason I can assign for the absence of cephalic and cervical valves generally, while the jugulars possess them, is, that the jugular system was the most important to our quadrupedal ancestors with dependent heads, hence valves developed in them, and that owing to the cranial blood-vessels developing, *pari passu*, with the cranium and its contents generally, largely after man had



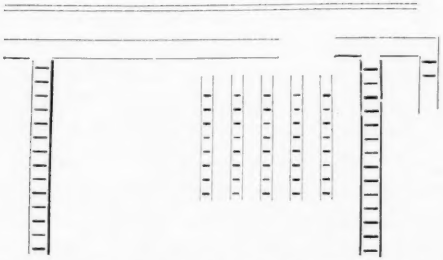

*a*, refers to the spinal system; *b*, jugular and caval to femoral; *c*, brachial; *d*, intercostal.

assumed the erect position, the valvular formation elsewhere in the head would not occur while the jugular valves became rudimentary.

Certainly valves in the hæmorrhoidal veins would be out of place in quadrupeds, but to their absence in man many a life has been and will be sacrificed, to say nothing of the discomfort and distress occasioned by the engorgement known as piles, which the presence of valves in these veins would obviate. The spermatic valves are as useful in man as in other animals.

A glance at the accompanying diagram will afford an idea of the confusing distribution of valved and unvalved veins in the human being.

The position assumed by these valved veins when man is placed on all fours, corresponds with those to be found in quadrupeds, thus:



A noticeable departure from the rule obtaining in the vascular system of Mammalia also occurs in the exposed situation of the femoral artery in man. The arteries lie deeper than the veins or are otherwise protected for the purpose, the teleologist would say, of preventing hemorrhage by superficial cuts. From the evolutionary standpoint it would appear that only animals with deeply-placed arteries would survive and transmit their peculiarities to their offspring, as the ordinary abrasions to which all animals are

subject, not to mention their fierce onslaughts upon one another, would quickly kill off animals with superficially located arteries. But when man assumed the upright posture, the femoral artery, which was placed out of reach on the inner part of the thigh, became exposed, and were it not that this defect is nearly fully atoned for by his ability to protect the exposed artery in ways the brute could not, he too would have become extinct. Even as it is, this aberration is a fruitful cause of trouble and death.

Another disadvantage which occurs in the upright position of man, is his greater liability to inguinal hernia. Quadrupeds have the main weight of abdominal viscera supported by ribs and strong pectoral and abdominal muscles. The weakest part of the latter group of muscles is in the region of Poupart's ligament, above the groin. Inguinal hernia is rare in other vertebrates because this weak part is relieved of the visceral stress, but as the pelvis receives the intestinal load in man, an immense number of tissues are manufactured to supplement this deficiency. It has been estimated that twenty per cent of the human family suffer in this way, and strangulated hernia frequently occasions death.

If man has always been erect from creation, then we have nothing to hope from the future by way of an alteration of this defect. The same percentage of humanity will suffer to the end of time; but considered mechanically the so-called conservative influence of nature which will tend to pile up additional muscular tissue in this region by reason of the increased blood supply to that part, aided by natural and sexual selection, will eventually reduce the percentage of ruptures greatly, if it does not eventually correct the trouble altogether. The liability to femoral hernia is similarly increased by the upright position.

The peritoneal ligaments of the uterus subserve suspensorial functions in quadrupeds fully, which require much ingenious speculation to be faintly seen in man. The anterior, posterior and lateral ligaments are mainly concerned in preventing the gravid uterus from pitching too far toward the diaphragm of four-footed animals. The round ligaments are absolutely meaningless in the human female, but in lower animals serve the same purpose as the other ligaments. Prolapsus uteri by the erect position and absence of support fitted to that attitude, are thus rendered frequent, to the destruction of health and happiness of multitudes.

As a deduction from mechanical laws, it could easily be imag-

ined that an animal or race of men which had the longest maintained the erect position would have straighter abdomens, widely flared pelvic brims with contracted pelvic outlets, and that the weight of the spinal column would carry the sacrum lower down, and in general terms we find this to be the case. In quadrupeds the box-shaped pelvis, which admits of easy parturition, prevails, but where the position of the animal is such as to throw the weight of the viscera into the pelvis, the brim necessarily widens, these weighty organs sink lower, and the heads of the femora, acting as fulcra, admit of the crest of the ilium being carried outward, while the lower part of the pelvis must be contracted. This box shape exists in the child's innominate bones, while its protruding abdomen resembles that of the gorilla. The gibbon exhibits this iliac expansion through the sitting posture, which developed his ischial callosities. Similarly iliac expansion occurs in the chimpanzee. The Megatherium had wide iliacal expansion, due to its semi-erect habits, but as its weight was mainly supported by the huge tail with femora resting in acetabula placed far forwards, the leverage necessary to contract the lower pelvis is absent. Professor Weber, of Bonn, noted by Carl Vogt, "Vorlesungen über den Menschen," etc., distinguished four chief forms of the pelvis in man: the oval, round, square and cuneïform, owned in order by Europeans, native Americans, Mongols and black races. Resting upon its own merits as an osseous mechanical proposition, it would seem that the older the race the lower the sacrum and the greater the tendency to approximate the larger transverse diameter of the European female. The anteroposterior diameter of the simian pelvis is usually greater than the transverse; a similar condition affords the cuneiform, from which could be inferred that the erect position in the negro races had not been so long maintained as by the Mongols, whose pelvis assumed the quadrilateral shape owing to persistence of spinal axis weight through greater time; this pressure has finally culminated in pressing the sacrum of the European nearer the pubes, with consequent lateral expansion at the expense of the anteroposterior or conjugate. From Marsupialia to Lemuridæ the box shape pelvis persists, but with the wedge shape induced in man a remarkable phenomenon also occurs in the increased size of the fœtal head in disproportion to the contraction of the pelvic outlet. While the marsupial head is about one-sixth the size of the

smallest part of the parturient bony canal, the moment we pass to erect animals the greater relative increase is there in the cranial size with coexisting decrease in the area of the outlet. This altered condition of things has caused the death of millions of otherwise perfectly healthy and well-formed human mothers and children. The palæontologist might tell us if some such phenomenon of ischial approximation by natural mechanical causes has not caused the probable extinction of whole genera of vertebrates. If we are to believe that for our original sin the pangs and labor at term were increased, and also believe in the disproportionate contraction of the pelvic space being an efficient cause of the same difficulties of parturition, the logical inference is inevitable that man's original sin consisted in his getting upon his hind legs.

Something of the changes noticed in the angle at which the head of the femur is set upon the shaft at different ages, is also noticeable phylogenetically. The neck of the femur in the child is obliquely placed, but in the adult is less so, and in advanced age tends to form a right angle with the socket. Both in the advance of age in the individual and the tendency of an animal to assume more and more the upright posture, this change of angle seems attributable to no other cause than bodily weight against the femoral heads.

This subject is not without direct application. Gynæcologists cause their patients to assume what is called the knee chest position, a prone one, for the purpose of restoring uteri to something near a natural position. Brown-Sequard recommends drawing away the blood from the spine in myelitis, or spinal congestion, by placing the patient on his abdomen or side with hands and feet somewhat dependent. The liability to spina-bifida is greatest in the human infant through the stress thrown upon the spine, and the absence of delivery troubles among lower races have reference to discrepancy between pelvic and cranial sizes not having been reached by those races. The Sandwich island mother has difficult delivery only when her progeny is half white, that breed being larger in the forehead than the native child.

The mechanism of the body, when fully recognized as mechanism and nothing else, and as governed by mechanical laws, physical as well as chemical influences, will place forthcoming physiological studies upon a broader, safer foundation, and result

in grand generalizations. The hydro-dynamics of animal life would alone furnish a theme for thousands of investigators. At present the world goes on in its blindness, apparently satisfied that everything is all right because it exists at all, ignorant of the evil consequences of apparently beneficent peculiarities, vaunting man's erectness and its advantages, while ignoring the disadvantages. The observation that the lower the animal the more prolific, would eventuate the belief that the higher the animal the more difficulties encompass his development and propagation, and the cranio-pelvic incompatibility alone may settle the Malthusian doctrine effectually for the higher races of men through their extinction.

FOOT-NOTE.—This article has a little history of its own, the nature of which shall be its excuse for publication here.

Some members of the Chicago University faculty asked me, last year, if I would accept the chair of Comparative Anatomy and Physiology in that institution. I replied that I would, but must be allowed to teach what I considered to be the truth, and that evolution was the only sensible basis for such instruction. The president of the faculty, a Baptist minister, was to call upon me, I was told, upon a certain day to arrange concerning salary and minor details. April 18, 1882, by invitation, I lectured before the Chicago University Club on the Disadvantages of the Upright Position. The subject and its treatment proved too Darwinistic, as a foretaste of my teachings, and the president did not call to see me. Since then Professor E. S. Bastin, who had ably filled all the scientific chairs in the university, was found to be teaching strict truth, to which no objection was raised, but the *effects* of such teaching upon the minds of the students was found to interfere with their docile gulping of all the antiquated rubbish dealt out from other chairs. A "safe" teacher was wanted, one who could use the text-books of last century's science. Professor Bastin resigned.

Another "university" hereabouts made the substitution of Egyptian mythology for botany optional in the classical course.

These tottering schools do not seem to have asked themselves why a half million people fail to support them, nor to be aware that Eastern colleges are filled with Western youth, who might as well be taught nearer their homes the branches they can learn only in other States.

The Academy of Sciences in this city has never recovered from the disaster of the great fire. The building has been forfeited through debts; large and valuable collections are being donated to it by Eastern institutions, but remain boxed up and unused. The last lecture I attended there was by a reverend gentleman whose thesis was the impossibility of the river Nile being more than 6000 years old. He based his calculations upon ten years' observations of the alluvial deposit at the mouth of a small creek in this State. Darwinism mentioned within these precincts has something of the effect of the red rag shown to the bull, though no objection has been raised against the delivery of evolutionary lectures.

The few scientific men Chicago has originated are drifting away from the place. Gigantic barter occupies the time and attention of the people exclusively. It will

probably be five hundred years before abstract science can be supported here, from present indications.

This paper has been withheld from publication three years, as I earnestly desired to make full dissections of widely diverging genera, to fully corroborate the general law which may be said to have been arrived at both inductively and deductively. The pathology of insanity now claims my entire time, and I must leave to others the completion of what I have begun.

There have been occasional passages in medical journals which bore upon the subject of the significance of valves in the veins, but I believe that no one has anticipated me in the announcement of the influence which gravitation exerts upon the creation of these valves in quadrupeds, and that man's veins are valved in such manner as to place his derivation from a quadrupedal form beyond dispute. The deductions from mechanical influences made in this paper are original, and I cannot find that they have been elsewhere mentioned. Certainly the publication of so sweeping a statement as that pertaining to the valves would have attracted universal attention among comparative anatomists had it been made before, and eminent gentlemen in that field have confessed to me that the matter was new to them.

Besides its reading before the University Club, April 18, 1882, the substance of this paper was presented by me before the Philadelphia Academy of Natural Sciences last May, as noted in AMERICAN NATURALIST, September, 1883.

——:o:——

## THE MAMMALIAN FAUNA OF THE AUSTRALIAN DESERT.

BY EDWARD B. SANGER.

THE physical conditions of the interior of Australia are not such as to support a varied fauna. The mammals are few in number, and are principally those which are best adapted for dry and arid regions. But four orders of Mammalia are represented, viz: Cheiroptera, Rodentia, Carnivora and Marsupialia. The first named order is represented by *Scotophilus moris*, the chocolate bat. These animals are very numerous. They live in hollow trees, and fly around in great numbers about dusk. To the natives, who catch and eat them, they are known by the name of "*oolowarra*." They are generally caught by chopping them out of the hollow trees in day time. This is the only species of bat that I observed in the interior. The Rodentia are represented by three genera and five species, viz: *Hapalotis conditor*, *H. mitchelli*, *H. cervina*, *Mus vellerosus*, *Hydromys fulvolovatus*.

*Hapalotus conditor* is the Australian building rat. It builds nests, among the sandhills near the creeks, of sticks, leaves, &c. The nest is very roughly constructed, and to a non-observing eye looks like a mere bunch of dry sticks. Inside it is lined with soft leaves and bits of grass. The entrance is a small hole on the

side. There is another mode of ingress or egress afforded by a tunnel burrowed by the rat from the floor of the structure underground to a distance of about three feet, when it rises to the surface in some clump of grass or small bush. This is evidently a mode of escape for the animal when surprised by aborigines or dingos (*Canis dingo*), which seem to be their only enemies. This rat is called "*kuckala*" by the natives, who prize them exceedingly as food.

*H. mitchelli* and *H. cervina* are both nocturnal jerboa rats. Their nests consist simply of a few leaves and bunches of grass raked together in some clump of bushes. The natives eat them and call them respectively "*arritchi*" and "*koolahroo*."

*Mus vellerosus* is a small rat which infests large tracts of country in droves during flood time. They migrate from place to place. Their well-beaten paths may often be seen winding through the sandhills, and sometimes the droves themselves. They are a great nuisance to the whites, as they eat up everything. Saddles, provisions and everything that can be hurt by an animal's teeth must be placed up in trees or stumps away from the ground when the nightly camp is made, or all will be destroyed before morning. The native (Dieyerie) name for them is "*miaroo*."

*Hydromys fulvolovatus*, the large Australian water rat, is common in all the prominent water holes on Cooper's creek. They live in holes in the banks, with one entrance opening under water and the other on the land. They live principally on roots, &c. The natives say that they kill and eat various water birds. I cannot say whether this is true or not, but I know that they will eat flesh. One day I shot some black swans (*Chenopis atrata*) and left them, after securing the skins, on the bank of a water hole. The next day I went there, and as I approached the dead swans I saw two or three water rats run away from them and disappear in the water. The swans were half eaten up, and had been dragged several yards nearer the water. I determined to make sure whether the rats had eaten of them or whether it was the dingos. I seasoned them with some strychnine and the next day found two dead rats by them. I think it is very probable that they do catch and eat birds. They are very large and ferocious, and can bite severely. The natives are afraid of them.

The Carnivora are represented by *Canis dingo*. This dog is

abundant wherever there are any animals for it to prey upon. Hence in regions where there are cattle and sheep they are more numerous than in outlying districts. The settlers poison them by preparing baits treated with strychnine.

They do not travel or hunt in packs, but are solitary. Neither have they any fixed nest or den. In settled districts they are very shy, as might be expected; but in the remoter parts they are bolder, and I have known them carry off my boots at night time, which is very inconvenient in such regions. They are orange-yellow in color, and have a large bushy tail. In fact they are very handsome when pure blooded, *i. e.*, have not mixed with other dogs belonging to the whites. They make a very mournful noise, howling at night. I have never heard the wild ones bark; they howl and growl only. They eat any animal that they can catch, lizards even. The smaller and more sluggish animals are the ones which fall a prey to them, as the dogs are no match for the kangaroo or wallaby in swiftness; indeed, an adult kangaroo can easily kill them, so the dogs wisely leave them alone. It is very amusing to see one twisting and turning in pursuit of a sandhill wallaby (*Bettongia grayi*); the dog is generally beaten in the race. Sometimes, however, when the dog catches the wallaby napping, the laugh is on the other side. The natives tame these dogs and always have a great number of them around their camp. Though they are kept in a half-starved condition, the natives seem to be fond of them.

The dingos interbreed with dogs introduced by the whites. So common is this, indeed, that in the more settled districts a pure-blooded dingo is a rarity. They are universally distributed, being found in all parts of the continent, and do not seem to vary in character at all. The natives have no traditions concerning them, as far as I was able to learn.

The Marsupialia of the desert are represented by three families, viz: the Macropidæ, Peramelidæ and Phalangistidæ. In the first-named order the largest form found in the desert is *Osphranter rufus*, the common red kangaroo. The male is red and the female bluish-gray. This animal is but rarely seen, and only after a heavy rain, when there is plenty of vegetation for it to feed upon. Towards the confines of the desert it is more numerous.

*Onychogalia lunata*, the crescent-marked, nail-tailed kangaroo, is also rather uncommon, and is almost always found on the stony plains or tablelands.

*Bettongia grayi*, Gray's jerboa or the sandhill wallaby, is found among the sandhills, and is solitary in habit. I never saw two of them together. It is very swift and dexterous, dodging in and out among the bushes in a surprising manner.

Among the Peramelidæ we find *Perameles fasciatus* and *Peragalea lagotis*, known respectively as the banded and the long-eared bandicoot. Both of them are found in the sandhill country.

*Chœropus castanopus* is also found, but it is rare.

Along the creeks, and especially where there are abundant water holes, phalangers (Phalangista) are abundant, but of what species I am uncertain.

The above are all the mammals that I met during my two years' sojourn. When the country is better known more will probably be found. The number of forms depends greatly on the character of the season. After a rain animals visit the desert that are not known there at other times. Hence the conflicting reports received so often on the subject. With the exception of *Osphranter rufus* those mentioned above are true desert forms; that is, they are always found there. It is worthy of note that the Marsupialia, though furnishing the greatest number of species, are not the predominating order of mammals. The Rodentia preponderate in number and almost equal the former in species. This is a notable exception to the other parts of the continent. It is still more interesting to notice that two (the jerboas) of the four species of Rodentia remarkably resemble certain forms of the Marsupialia. Like physical conditions seem to tend to produce similar forms out of different types of animals. In other parts of the continent certain marsupials have developed into carnivores curiously resembling some forms among monodelphian Carnivora.

The mammals living at present in the desert are small, and are well adapted to the life they lead. When contrasted with the giant marsupials which once inhabited the region, and whose remains we now find here and there in it, we can see how much the character of the fauna depends on the constancy of the physical conditions of the region. Slight changes produce great results.

# OBSERVATIONS ON THE PULSATING ORGANS IN THE LEGS OF CERTAIN HEMIPTERA.[1]

BY WM. A. LOCY.

CONFLICTING opinions have been held regarding the pulsating organs that have, from time to time, been observed in the legs of certain Hemiptera.

They were first drawn and described by Behn, in 1835. These observations were at once called into question by Léon Dufour, who at that time was the acknowledged autocrat of the anatomy of the Hemiptera.

Dufour considered that these movements were due to contractions of the ordinary muscles of the legs and denied the existence of the blood currents observed by Behn. The scientific value of Dufour's opinion on this point loses its force on account of his well known hostility to the theory of circulation of the blood in the Insecta.

In the summer of 1883, while working on the circulation of blood in the Hemiptera, these organs came under my notice, and the following is a simple record of observations made to determine:

(1) Whether these organs are distinct from the muscular system of the legs, and

(2) Whether they influence circulation?

To both of these questions the evidence is for an affirmative answer. During the progress of the work their automaticity was also observed and well established.

*Methods.*—Different genera of the aquatic Hemiptera were fastened upon a microscope slide, their legs spread out in glycerine and covered with a cover-glass. The legs thus prepared were studied with both low and high powers of the microscope. Specimens for examination were chosen with reference to the transparency of their legs, as it is upon this point that success of observation depends. Both larval and adult forms of the genera studied were used, but the best results were uniformly obtained with the larval forms, on account of the greater transparency of their legs.

In some cases special methods were necessary to render the legs transparent enough for observation. For this purpose the

[1] Work from the Biological Laboratory of Mt. Morris College, Mt. Morris, Illinois.

integument of the legs was scraped very thin. The organs can be demonstrated in this manner, even in the thick legs of the adult Belostomæ.

The organs are most easily seen in the legs of Notonecta and Corixa, but are not so large and pronounced as in the legs of the Nepidæ. In the more transparent individuals not only are the organs readily seen, but the circulation of the blood can be watched with a power high enough to bring out the corpuscles.

The pulsating organs were noted in the following genera: Corixa, Notonecta, Gerris, Belostoma, Perthostoma and Ranatra; particular attention having been given to the organs in Belostoma, Perthostoma and Ranatra.

*Description.*—These organs are found in the three pairs of legs of all the genera mentioned above. They are generally in the tibia of the leg, just below its articulation with the femur. In the raptorial legs of Ranatra, however, the organs are in the clasp-joint or tarsus just below its articulation with the tibia.

Examined with a power of seventy-five diameters, they appear as little whip-like organs pulsating rapidly. In the Nepidæ they lie outside the median line of the leg, towards the front side, being slightly convex towards the outside. This curved body which forms the bulk of the pulsatile organ, is attached at both ends and from its sides several attachments extend upwards and backwards to the integument of the leg (see Fig. 4).

The shape in Corixa and Notonecta is quite different; it is somewhat hand-shaped in Notonecta, and in Corixa the shape of an inverted letter L, with its lower portion prolonged. This hangs down into the leg-cavity beyond the median line.

Crossing these organs obliquely, in the Nepidæ, lie the muscular fibers of the legs. The bands of muscle appear either straight or wavy, according as the legs are bent or extended, and remain perfectly quiet while the organs are beating. A careful study of the muscular system of the legs was first made, to avoid confusing it with the organs in question. With a power of 150 diameters it can be made out very satisfactorily that the pulsatile organ is a thing separate from the muscular fibers of the leg, and does not involve them in its motion. This is best seen by focusing back and forth. When we have the muscles clearly in focus, the movements of the pulsating organ can still be seen lying a little out of focus. In some of the thick-legged specimens, where a dis-

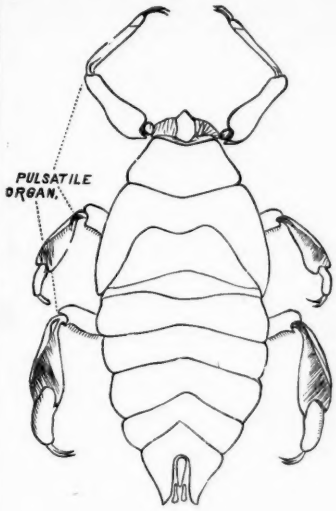



FIG. 1.

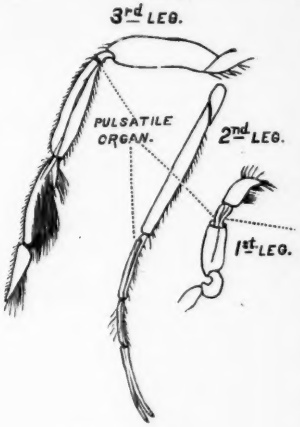



FIG. 2.

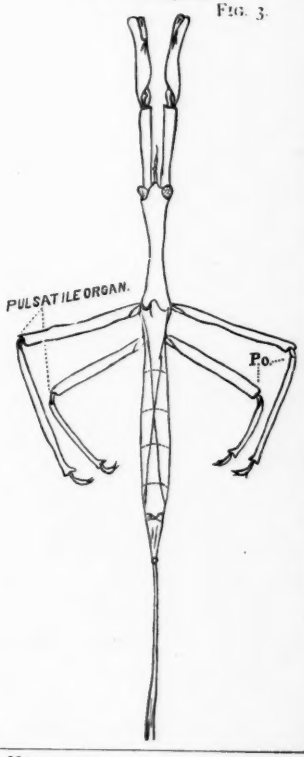



FIG. 3.

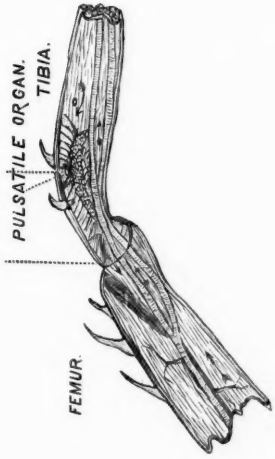



FIG. 4.

PULSATING ORGANS IN HEMIPTERA.

tinct focus could not be obtained, the pulsations seemed to involve the muscular fibers, but scraping the integument thin, so as to admit more light, showed that this appearance was due to the general indistinctness.

The pulsating organs are also unaffected by the movements of the muscles of the legs. On several occasions, when the legs were moving back and forth and the muscles all in action, the pulsatile organ has been observed beating naturally, wholly unaffected by their movements.

*Influence upon circulation, etc.*—In studying the influence of these organs on circulation, they were observed with powers of the microscope ranging from 187 to 438 diameters. Either of these powers is sufficient to bring out the blood corpuscles.

In the legs of the insects in question there are two blood currents, an outgoing current and a returning current. The outgoing current passes along the inside of the leg, below the pulsating organ, and the returning current passes to the outside of the leg, above the pulsating organ. As the blood currents flow near the pulsatile organ they move faster, and around the organ itself there is a whirlpool of motion. Here the corpuscles can be seen rolling over and over one another, and striking against the pulsatile organ, by which blow they are driven whirling along their course.

The beating of these organs in the Nepidæ is such as to aid circulation in both directions; and of their influence over it there is abundant proof. The motion of the pulsating organ is difficult to analyze and describe. In an organ beating slowly the motion is seen to originate in the posterior end, spread wave-like forwards to about the middle of the organ; the anterior end simply rising and falling. It may be likened to the motion of a whip-lash, resting on the ground, when the stock is given a quick upward stroke. It is to be understood that the "anterior end" means the end towards the head of the insect, and the "posterior end" the one opposite, towards the extremity of the leg. The attachments have no movement of their own, but are set in motion by the organ. This motion in the rapidly-beating organ resolves itself into an upward beat of the posterior end almost simultaneous with a downward stroke of the anterior end. Such an arrangement would aid the circulation of the blood. As the posterior end beats upward, it would make room for the outgoing cur-

rent and, at the same time, force along the returning current. The outgoing current would almost instantaneously receive an impetus from the downward stroke of the anterior end.

The influence of the pulsating organ on circulation is shown, not alone by the energetic movements of the blood currents in its vicinity, but also when the motion ceases in it the blood currents stop. I have never observed circulation in the legs while these organs were quiet; nor have I failed to detect it when they were in motion, except in a few specimens too opaque to show the blood corpuscles. The stopping and commencing of the blood currents, induced by the pulsating organ, have been repeatedly observed. As soon as the pulsatile organ stops, the blood currents immediately cease in that particular leg, and the first motion of the blood is a slow retrograde movement which is particularly noticeable around the pulsatile organ, since here the corpuscles are thickest. A slow oscillation sometimes takes place, similar to the movements in a frog's capillaries, when circulation is suspended in the web. With the first stroke of the pulsatile organ, circulation is resumed, and continues until the pulsatile organ again stops.

The influence of each pulsatile organ is confined, as near as I can make out, to a single leg, as circulation was noticed in progress in the body and in other legs during its cessation in one leg.

In their intermittent action the periods of rest are comparatively short and independent of each other. Their periods of rest sometimes correspond, however, and the pulsatile organs of one side of the body may all be in a quiescent state at the same time.

My observations on the rate of beating of these organs are fragmentary, but, as far as they extend, they show that while considerable irregularity exists in this regard, the rate of the pulsatile organ is always faster than the rate of the heart in the same insect. For instance, in Belostoma where the heart beats were from thirty-four to forty-five per minute, the pulsating organs were beating from 127 to 150 times per minute. In Notonecta, where the heart was regular at seventy per minute, the pulsatile organs were beating 170 to 216 times per minute. In Ranatra the pulsations were several times counted as high as 175 per minute. These insects were too opaque to admit of counting the heart bearts.

*Observations on Amputated Legs.*—A strong proof that the pulsatile organs are separate from the general muscular system of the legs, is found in their automaticity. About twenty-five observations have now been made with the amputated legs of Ranatra and Perthostoma to study this phenomenon. When an amputated leg is placed under observation, the pulsatile organ is seen in motion similar to its action during life. It has already been noted that the pulsations are somewhat intermittent in life, and this characteristic is usually aggravated after amputation, so that the stops are more frequent and longer continued than before amputation.

These observations are not complete enough to establish the limit of automaticity. In one instance, however, I traced the beating of the pulsatile organ in the amputated leg of an adult Ranatra through a period of twenty-six hours and twenty minutes. The duration of beating in an amputated leg is probably greatly affected by circumstances, and it may, therefore, continue longer than in the case just cited, or stop sooner, according to circumstances.

The pulsating organ continues its beating even when sliced portions of the legs are used instead of whole legs. It was cut in two, and the posterior part, which was attached to a fragment of the leg, still continued to beat.

One set of observations on an amputated leg, that fairly represents the others, is given below in detail:

On Oct. 3, 1883, the front leg of an adult Ranatra was put under observation at 1.45 P. M. The pulsations were regular from 135 to 140 per minute. After watching for ten minutes the leg was cut off close to the body with a sharp razor. During this operation the eye was kept upon the pulsating organ through the microscope. The only perceptible effect was a slight increase in the rate of beating, which was now found to be 146 per minute. For the next ten minutes the amputated leg was under constant observation. It continued beating during this time, towards the close at a slightly diminished rate, say 135 pulsations per minute. At 2.05 P. M. I was called away.

The next observation was made after an absence of one hour and thirty minutes, at 3.35 P. M.; the organ was then beating regularly at 115 pulsations per minute. No change was observed up to 3.45 P. M., at which time the specimen was laid aside.

From 4.20 P. M. to 9 P. M. seventeen distinct observations were made, varying from one to seven minutes each. The actual time spent at the microscope during this period was forty-five minutes. For four minutes of this time the organ had been quiet.

After 5.20 P. M. it gradually fell from 103 pulsations per minute to 43 per minute, at 8.30 P. M.; from this time it began an increase that had reached 116 at 8.55 P. M.

From 9 P. M. to 10.30 P. M. forty-seven minutes were spent at the microscope, divided among thirty-six observations, the pulsations during this time gradually falling from 120 per minute to 50 beats per minute.

At 10.50 P. M. I retired, leaving the organ beating at 50 per minute.

The following morning, Oct. 4, 1883, at 6.50 A. M., the organ was not beating. At 9.50 A. M. regular observations were again commenced, and up to 1.27 P. M. twenty-nine distinct observations had been made, occupying thirty-eight minutes of actual study. The rate varied from 67 to 24 beats per minute, being the greater part of the time at 55 per minute.

No sudden transition of rate was observed in this specimen; the fall from 67 to 24 taking place gradually, the lowest limit having been reached, the rate would again increase to the high limit. Hot air blasts were several times blown over the microscopic slide after the organ had been beating twenty-one hours. The usual effect was to increase the rate and strength of beating for a short time.

The other observations do not differ in any essential particular from the one given above. They were all made in less time, however; the longer ones being several hours shorter than the one detailed.

The automaticity has also been noted in the amputated legs of Notonecta and Corixa.

The work on the histology of these organs has yielded, as yet, no definite results.

To conclude, then, in my estimation the three points mentioned at the outset have been established, viz:

(1) The pulsatile organs are separate from the muscular system of the legs.

(2) They influence circulation.

(3) They are automatic.

EXPLANATION OF PLATE I.

FIG. 1.—Belostoma larva, to show the location of the pulsatile organs. In all three pairs of legs they are in the tibia, just below the articulation with the femur.

FIG. 2.—Location of the pulsatile organ in the legs of Corixa. In this genus the chitinous cord, to which the pulsatile organ seems attached, is set in motion by its beating. The motion of this cord sometimes extends through three joints.

FIG. 3.—Ranatra, adult, to show the exceptional position of the pulsatile organ in the fore legs.

FIG. 4.—The pulsatile organ as seen in the tibia of an adult Ranatra. At the posterior end are seen the attachments extending upwards and backwards to the integument of the legs. Crossing the anterior end and middle portion are the oblique muscular fibers of the legs. The tracheæ are plainly shown. The arrows indicate the direction of the blood currents.

——:o:——

## ON THE CHARACTER AND FUNCTION OF THE EPIGLOTTIS IN THE BULL-SNAKE (PITYOPHIS).[1]

BY CHARLES A. WHITE, M.D.

AMONG the more commonly known serpents of the United States there is a group of species which naturalists range under the generic name of Pityophis, and which are distributed from the Atlantic to the Pacific coast. To all these species the popular name of bull-snake is applied, and the more common eastern variety is also often popularly called the pine-snake. They are great, good-natured fellows, always getting out of man's way when they can, but occasionally, if they are pressed, they will throw themselves into a somewhat threatening attitude and emit a peculiar hiss. The old naturalist, William Bartram, spoke of it as a "terrible hiss, resembling distant thunder," but even with the popular dislike to serpents, I think few persons would regard the hiss of the bull-snake as at all terrible or thunderous.

Baird and Girard, Cope, and Yarrow, have all published lists of species of Pityophis. Baird and Girard enumerated seven species; Cope, five species, dividing one of them into three varieties; and Yarrow four species, dividing one of them in two varieties.

All these forms have similar habits, and all, at times, produce a similar hoarse, hissing sound. It is well known that a hissing sound is produced by other serpents as well as other animals; but the hiss of the bull-snake has a peculiar hoarseness which is sometimes so loud that, with the help of the imagination, it appears to have

[1] Read before the Biological Society of Washington, October, 1883.

suggested a likeness to the low, rumbling bellow of the bull; hence the popular name of these serpents. The peculiarity of the hiss of the bull-snake is due to the character and posture of the epiglottis. This organ is absent, or represented only by a small tubercle, in all other serpents which I have examined. It is present in all the species and varieties of Pityophis. It is of the same general character in all, although it varies a little in shape in the

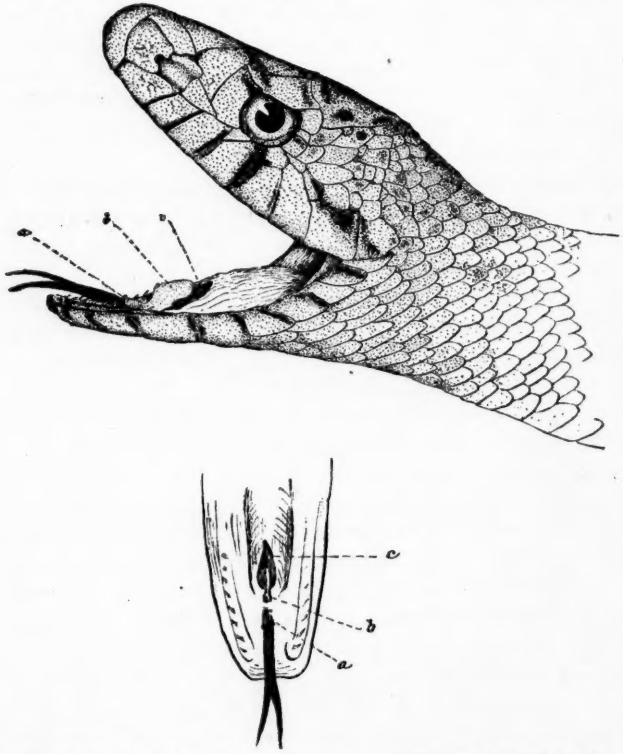



FIG. 1.—Lateral and view from above of Mouth Parts of the Bull Snake.

different species, and also somewhat in different individuals. I therefore regard this feature as a generic character, although it is not improbable that some of the nearer allies of Pityophis will be found to possess a similar epiglottis. The accompanying figures, drawn from nature by my friend Dr. R. W. Shufeldt, U. S. Army, represents the mouth-parts of *Pityophis sayi* var. *bellona*. The

tongue-sheath is represented at *a;* the epiglottis at *b;* and the rima-glotidis (aperture of the windpipe) at *c.*

The epiglottis is a thin, erect, flexible, flag-shaped or curved-spatulate body, situated upon the median line immediately in front of the rima-glotidis, and with its free end directed upward and backward, its posterior edge curving partly over the rima. It is evidently this epiglottis that produces the hoarseness of the hissing sound, which it accomplishes by dividing, and fluttering in, the strong current of air which is forced from the lung out of the rima.

That this peculiar body is really the homologue of the epiglottis in the higher animals, is shown by its position in relation to the other parts of the mouth. It differs from the epiglottis in those animals by being placed longitudinally instead of transversely, and in not being hinged, and therefore not capable of falling down to cover the rima in the act of swallowing. As serpents' food is not comminuted, but swallowed whole, such protection to the rima is unnecessary.

——:o:——

## THE CAROLINA WREN; A YEAR OF ITS LIFE.

BY CHARLES C. ABBOTT, M.D.

EARLY in the morning of Sept. 1, 1882, as I was passing near the stable, my attention was called to the shrill notes of an excited little bird that, darting from the building, alighted on the fence near by and screamed *Jimmée, Jimmée, Jimmée,* so loudly, that every James in the township should have hastened thither. No response came, and again the call, a clear, penetrating whistle, was repeated. This continued, at brief intervals, for two or three minutes, and then, as quickly as it came, the bird flew back to the stable, entering through a knot-hole in a weather-board with such rapidity of movement that I could but marvel at its dexterity.

Half an hour later I saw this same bird again, coming from the stable through the same knot-hole, and this time it sang as loudly, impatiently and frequently as before, but the notes were different. It said, or seemed to say, *tsau-ré-ta, tsau-ré-ta, tsau-ré-ta.* Had I not seen the bird I should have recognized it by a peculiarity in its song, which was never wanting whatever might be the particular notes it uttered. My attention being called to this little bird—the Carolina wren (*Thryothorus ludovicianus*)—I deter-

mined forthwith to study its habits, as opportunity presented, for the little that I find recorded of it is far from satisfactory.

What might be the attraction in the stable was my first object to determine, for I did not suppose it had a nest so late in the season, and I had not noticed the bird particularly during the summer months, although I knew they were in the neighborhood. A protracted search failed, indeed, in finding any nest, but while I was wandering about I was surprised to see the wren enter the building and proceed immediately to search for spiders, which hitherto were abundant in every nook and corner, but now were comparatively scarce. Once the bird alighted upon the back of a horse standing in its stall, and while there quietly preened its feathers, as much as a wren ever deigns to do this, and then with a shrill chirp, that startled the animal, away it flew in search of more spiders.

Late in the afternoon of the same day I again saw the wren enter the stable and pass directly through the mow-hole to the hay-loft overhead. I followed and found that the bird had taken possession of a barn-swallow's nest, and here it was keeping bachelor's hall. The nest was placed against a rafter, near the peak of the roof, and was quite inaccessible to cats. This probably the wren did not consider. It is a sly cat that ever catches a wren napping. The bird did not like my discovering his hiding place, or at least was annoyed by my inquisitiveness. It circled about me several times, snapping its beak I thought, and chirped an unusually emphatic *tsip*, which I took to be the wrennish for "damn."

All through the mellow September days, early and late, the clear notes of this wren were to be heard, and through October, and long after every summer songster had departed, I heard them daily and many times a day.

During the autumn there was little to note with regard to the bird's habits. The insects in the stable and outbuildings afforded it a sufficient food supply, but during exceptionally warm and sunny days it made frequent visits to a wooded slope near by, and there, among the giant oaks and chestnuts, it seemed more lively and full of song than when nearer home.

A few words with reference to the character of its song. Every utterance is sharply defined by a peculiarity that belongs only to this bird. I think I should know the bird, by its voice, wherever I might hear it.

Again, while the bird has a great variety of notes, I believe I have never heard it mingle these various utterances. It may chance to whistle *jimmée* or *tsau-ré-ta* or *phoé-do*, but it never follows one with the other. It is in all cases a repetition of the notes it first utters. Thus I once recorded its song as uttered during ten minutes. Its notes then were *phoédo, phoé-do, phoé-do phée !* with a rest of some five to ten seconds; then repeated, and this continued without any variation until the notes as here given had been uttered sixty-four times. As the bird was about commencing the sixty-fifth repetition it was frightened and flew off. A half hour later the bird took up its position on a hop-vine pole and sang the notes represented by the syllables *tsau-ré-ta* forty-seven times, with intervals of about five seconds between each utterance.

I find it very generally stated that this wren is a "mocker," imitating many of our common songsters. Evidences of this have never come under my notice. Carefully as I have listened to this wren for a year, I have never heard a note that I should consider as not its own, and not borrowed. It is not safe, however, to conclude that it does not mimic other birds, because the one I have studied failed to do so. One's observations must cover a wider range of territory, and extend over many years, before it is safe to be positive in the matter of the habits of birds. Only recently I read a most painful account of the many dangers to which birds nesting in the valley of the Hudson river are exposed. According to the writer but very few broods are successfully reared. Happily, here in the Delaware valley the birds are more fortunate, and a failure is the exception, not the rule. So, too, it may be with the songs of birds. My Carolina wrens do not mimic, but perhaps my neighbor's do.

At the onset of winter, which in 1882 was late in November, the wren seemed unusually active, and sang even more frequently than during the sunny days of early autumn. At this time the characteristic tyrannical temper of the wren tribe showed itself. My wren had preëmpted the immediate vicinity of the stable, barn and other outbuildings, and woe betide any trespasser; snowbirds, sparrows, titmice and even bluejays were promptly warned off by the little tyrant. If they questioned his authority it was only to their sorrow. So it proved the long winter through. No other birds came near to stay. Spider-hunting, fighting and singing occupied all its moments, and, I am told, it

was often heard to whistle late in the night. Probably it was dreaming, which is not to be wondered at, considering the activity of the bird's brain when awake.

Thus for six months this bird lived quite alone. It certainly never wandered far at any one time. It was seen at too short intervals for this. But if lonely it was not morose, and to all appearance throve admirably from September to March.

From March to September it lived another life. As early as the 7th it appeared upon the scene with a companion. The two were very noisy and demonstrative. I could not detect much evidence of affection, and at times their actions were strongly suggestive of quarreling. This, however, did not last long. In the course of a week they had settled all their little differences, and hunted the spiders in the outbuildings, and early insects everywhere, in company. The song of the male bird was now more varied and frequent, yet never with a trace of mimicry of the notes of other birds. Its song in volume exceeded even the clear whistle of the cardinal grosbeak, and could be heard distinctly for half a mile during a still morning.

March 18 was a pleasant, spring-like day, and an early Maryland yellow-throat was singing merrily. This drew me out of doors, and I noticed directly that the Carolina wrens had commenced nest-building. Both birds were busy carrying long grass, strips of inner bark of shrubs and an odd thread or two that were found near by. One bird examined the clothes-line carefully, but could not succeed in unraveling any portion.

Following the wrens, I found they had located on the upper surface of one of the plates of the frame of the barn. The nest was directly under the roof, and quite filled the space between the upper surface of the plate and the shingles, about six inches. The nest, when completed, except the lining, was quite a foot in length. It was, in fact, a mere shapeless mass of loose material. Into this the female wren burrowed and remained most of the time, while the male bird brought softer fibers and chicken feathers. With these the cavity was lined and the nest completed.

March 24 an egg was laid, and another each day until the 29th, when the hen commenced setting. During the days that followed the male bird was very active in supplying his mate with food, and took his turn in caring for the eggs, but evidently under protest; this I conclude from the super-merry songs he uttered on

being relieved. Indeed it is a marvel to me that even a female wren can sit still. They have such nervous temperaments that an entire change of nidification, whereby solar heat could be depended upon, would, no doubt, be hailed by them with joy.

Five young birds were hatched April 9. When twenty days old they were able to fly, and had left the nest and apparently their parents. I saw them, evidently shifting for themselves, two days later, when they disappeared. May 14 the old birds were again building a nest, this time in another building, but in a similar position. The structure was identical in shape and size, but differed in being largely lined with snake-skins. It was completed by May 20, and a week later seven eggs had been laid, and June 7 six eggs were hatched. The young were on the wing July 1. July 15 a third nest was found nearly completed. Five eggs were laid by the 23d, and on August 8 the young birds of the third brood had appeared. These could fly by the 26th of the month, and had left the nest and the neighborhood by the 30th.

It is now a few days more than a year since my attention was particularly called to the single Carolina wren that frequented the stable. During the past twelve months it was closely watched, and every habit noted. When I was absent others observed it for me, and nothing of importance escaped attention. While I am writing these concluding lines I can hear the bird singing merrily as it sits upon the top of the hop-vine pole, of late its favorite perch. While listening to its song it is a proper time to sum up the results of what I have seen and heard. As a songster it ranks very high, and its utterances were all original. As a spider-hunter it is as active as any of the family of wrens. As a courageous foe of the English sparrows it is a blessing to the community.

# THE BATRACHIA OF THE PERMIAN PERIOD OF NORTH AMERICA.

BY E. D. COPE.

THE class Batrachia holds an important position in the history of the Vertebrata, as the first member of that kingdom which occupied the land on the advent of the conditions suitable for air-breathing types. It thus stands in ancestral relation to the lines of the Sauropsida and Mammalia, and as the immediate descendant of the fishes.

There are several orders of Batrachia, and they display remarkable diversities of skeletal structure. For the better understanding of these, I give the following table of their principal definitions :[1]

I. Supraoccipital, intercalary and supratemporal bones present. Propodial bones distinct.

Vertebral centra, including atlas, segmented, one set of segments together supporting one arch ..... *Rhachitomi.*

Vertebræ segmented, the superior and inferior segments each complete, forming two centra to each arch. ..... *Embolomeri*

Vertebral centra, including atlas, not segmented; one to each arch.... *Stegocephali.*

II. Supraoccipital and supratemporal bones wanting. Frontal and propodial bones distinct.

*a* An os intercalare.

A palatine arch and separate caudal vertebræ..... *Proteida.*

*aa* No os intercalare.

A maxillary arch; palatine arch imperfect; nasals, premaxillaries and caudal vertebræ distinct ..... *Urodela.*

Maxillary and palatine arches distinct; nasals and premaxillaries united *Gymnophiona.*

No maxillary or palatine arches; nasals and premaxillary, also caudal vertebræ, distinct..... *Trachystomata.*

III. Supraoccipital, intercalare and supratemporal bones wanting. Frontals and parietals connate; propodial bones and caudal vertebræ confluent.

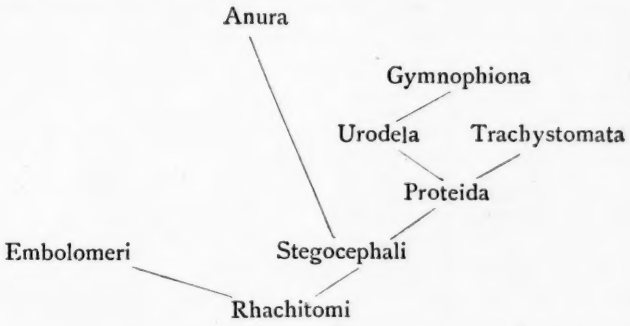
Premaxillaries distinct from nasals; no palatine arch; astragalus and calcaneum elongate, forming a distinct segment of the limb..... *Anura.*

The animals of the division I are all extinct. Division II includes the salamanders and their allies, with the worm-like Cœcilians (Gymnophiona); while the third division embraces the frogs, toads, etc.

[1] This is partly derived from the table which I have given in Vol. II Palæontology of the Geological Survey of Ohio, 1874, p. 352. See also Proceedings Philadelphia Academy, 1868, p. 211.

The characters displayed by the three divisions in question, indicate their relationships to be as follows: The orders of division 1 present in their cranial structure a greater resemblance to the limb-finned or crossopterygian fishes, than do either of the others. The third division is the most divergent from that type, and is in various respects the most specialized. This specialization consists not only in a departure from the primitive Batrachia, but also from all other forms of Vertebrata. Its specialization is seen in the loss and coössification of various parts of the skeleton. The Urodela display characters intermediate between the extremes of the class. Near them the Trachystomata (Sirenidæ) are inferior by loss of parts of the skull, and of the pelvic arch, the result, probably, of a process of degeneration. The same is probably true of the Proteida, which have lost the maxillary arch of the Stegocephali, but retain their os intercalare.[1]

As regards the extinct orders, the primitive type is evidently the Rhachitomi, whose vertebral column displays an arrest of characters which are transitional in the higher Vertebrata. From this group the orders Embolomeri and Stegocephali have evidently been derived. We may then present the following genealogical table of the class Batrachia:




As regards the connection of the class, as a whole, with other classes of Vertebrata, it is very probable that the extinct orders, as the Rhachitomi, were derived from some extinct form of Dipnoan fishes more or less related to the group of which the genus Ceratodus is a representative. In this type we have a persistent chorda dorsalis; fins which present the type from which ambulatory

[1] Of Cuvier; Epiotic of Huxley, according to Vrolik.

limbs were derived; a pelvis; and a cranium nearer that of the batrachians than most other fishes present. The Crossopterygia are a little on one side of the parental stem, since they have no pelvis, and their limbs begin to show a beginning of that reduction and specialization, which is carried to such an extent in the Actinopteri, or typical fishes.

The Batrachia are supposed by Professor Huxley to have given origin to the Mammalia. There are many reasons to sustain this view, nevertheless no progress has yet been made by palæontological research in filling up the great interval which separates the Permian Batrachia from the Mesozoic Mammalia. It is also true that the limb bones of the Permian Reptilian order of the Theromorpha more nearly resemble those of the lowest Mammalia, the Monotremata, than do those of any other known forms.

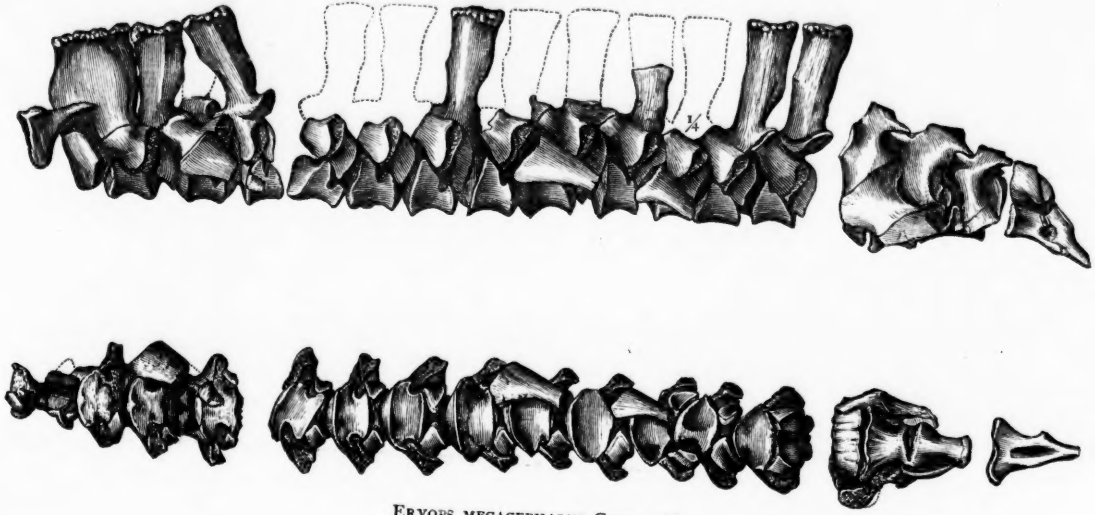
### The Rachitomi.

I proposed this name[1] for a division of the Batrachia which predominated during the Permian period in both the old and new worlds. As stated above in the differential table, it is characterized by the primitive condition of its vertebral column. The cartilaginous chorda dorsalis was present in life, and the vertebral bodies are represented by ossifications of its sheath. In the Trimerorhachidæ this ossification is superficial or cortical, while in the Eryopidæ it penetrated more deeply into the chorda. The segments of the centrum are three in number, an inferior one or intercentrum, and a superior lateral one on each side, the pleurocentrum, as it is called by Gaudry. The lateral pieces support the neural arch, and on this account I have called them the centrum proper, as distinguished from the intercentrum. The neural arch is unbroken, and displays articular processes (zygapophyses) of usual form, and in some genera a large neural spine.

The shoulder-girdle of these animals is remarkable for the small size of the coracoid element, resembling in this respect the salamanders, and approaching the mammals. There is probably a clavicle, as has been observed by Gaudry in Actinodon. He also finds the three thoracic shields of the Stegocephali (episterna and entosternum). I have such bones associated with the American forms, but have not yet determined their species. The humerus has no head, but a band-like articular surface instead.

[1] American Naturalist, 1882, p. 333.

PLATE II.



ERYOPS MEGACEPHALUS Cope. ¼

Its condyles, when present, are, on the other hand, well developed, and resemble those of salamanders, and of certain Mesozoic and lowest Tertiary mammals, as Meniscoëssus of the Laramie, and Catopsalis of the Puerco. The terminal phalanges were not converted into claws, but were flat and obtuse, as in existing Batrachia.

The pelvic arch is intermediate between those of the Anura and salamanders, and resembled closely that of the Pelycosaurian division of the Theromorphous reptiles of the same age. The pubis and ischium are solidly united, without the intervention of an obturator foramen, and those of opposite sides form a boat-shaped body. This is suspended from the sacrum by a vertical ilium, which rises from near the middle of each side. Its proportions are about as in the salamanders. The femur has no head proper, and the distal condyles are better distinguished than in any other Batrachia and than in most Reptilia.

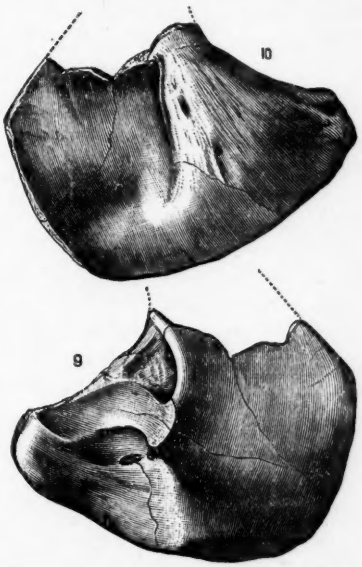



FIG. 1.—*Eryops megacephalus* Cope. Inferiol part of scapular arch of a different individuar from that represented in Pl. II; four-fifteenths nat. size. Upper figure from front; lower, posterior view.

The species of the Rachitomi are rather salamander-like in proportions, with relatively short legs and long tail, except in Eryops, where the latter was probably represented by a stump (see Plate II). They had relatively large heads with wide gape, as in the frogs. None of the known species can be supposed to have had powers of leaping as in those modern animals.

None of the known species had a formidable dentition, and in all of them the dentine is simply inflected, so that the section of a tooth presents a mass of closely-packed radii.

The two families of this order are well distinguished by the

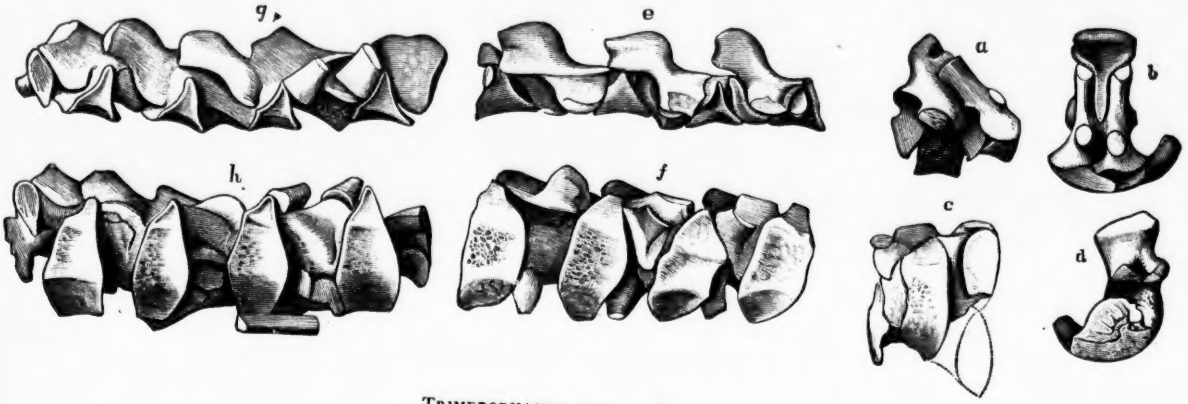
form of the basioccipital bone. In the Trimerorhachidæ its condyle is simple and concave, somewhat as in some fishes. The Eryopidæ have the two condyles characteristic of Batrachia generally. This difference might be esteemed as of greater than family significance, but it is less considerable than at first sight appears. The single cotylus-like basioccipital bone of the Trimerorhachidæ is notched above, sometimes deeply, to receive the apex of the notochord. A corresponding notch on the inferior edge would, if present, divide the articulation into two surfaces, which would greatly resemble the condyles of Eryops. The latter are flat and look partly towards each other, and are evidently separated originally by the *fissura notochordæ*.

To the Trimerorhachidæ I have referred, with certainty, only the genus Trimerorhachis. I have been unable to learn the structure of the vertebræ in the European genus Archegosaurus. According to some authors they are simple, as in the Stegocephali. Specimens of this kind, of the size of the *Archegosaurus decheni*, are found in the locality where the latter occurs, *i. e.*, Saarbrücken in Alsace; while rachitomous vertebræ from the same locality are of larger size, and resemble those of Eryops (Mus. Princeton, N. J.).

I have called attention to the structure of the vertebral column of the Rachitomi from a mechanical standpoint.[1] The notochord persists, the osseous elements about it in the sheath or skin, in the form of regular concave segments much like such segments as are cut from the skin of an orange, *i. e.*, parts of spheres, having greater or less thickness according to the group or species. Now the point of divergence of these segments is on the side of the column, the upper segments rising, and the lower segments expanding downwards. To the upper segments are attached the arches and their articulation, and the lower segments are like the segments of a sphere. If you take a flexible cylinder, covered with a more or less resistant skin or sheath, and bend that cylinder sidewise, you will of course find that the folds of the surface will take place along the line of the shortest curve, which is on the side; and, as a matter of fact, you will have breaks of very much the character of the sutures of these vertebral segments. It may not be so symmetrical as in the actual animal, for organic growth is symmetrical so far as not interfered with; for, when we have two

[1] *Science*, 1883, p. 276.

PLATE IV.




TRIMERORHACHIS INSIGNIS Cope. $\frac{1}{1}$

forces, the one of growth and the other of change or interruption, and they contend, we still have in the organic being a quite symmetrical result. In the cylinder bending in this way, of course the shortest line of curve is at the center of the side of the cylinder, and the longest curve is at the summit and base, and the shortest curve will be the point of fracture. And I presume it has happened in the case of the construction of the segments of the sheath of the vertebral column that the lateral motion of the animal swimming has been the actual cause of the disposition of the osseous material in this form.

A very good illustration of the effect of bending of a more or less flexible cylinder may be seen in the folds on the inner concave side of one's coat sleeve. In the accompanying figure the folds in the cloth represent the lines of flexure, or what would be

FIG. 2.—Sleeve of a coat, showing folds produced by lateral flexure, which leave interspaces similar to the segments of a rachitomous vertebra. Thus *i* represents intercentrum, *p*, pleurocentrum, and *n*, neurapophysis.

in a seat of ossific deposit, of interruption; while the interspaces represent the segments bounded by such lines. The correspondence with the segments of the vertebræ of the Rhachitomi is remarkable. At the base we have the wide lenticular intercentrum (viewed partly from below in the cut); between their lateral apices we have the pleurocentra, and above, another segment, which in the vertebra is the base of the neural arch.

The view that the segmentation of the vertebral column is the result of lateral alternating strains, was proposed by Herbert Spencer (Principles of Biology, II, p. 195). The present researches confirm this hypothesis in general. Mr. Spencer did not, however, specify the kind of segmentation to be expected from this process, and leaves it to be inferred that the segments will be cylinders of greater or less length. Thus he says (p. 205) "in a vertebral column of which the axis is beginning to ossify, the centrums consist of bony rings inclosing a still continuous rod of cartilage." And it is true that this is the primitive form in

embryology, but whether true in any instance in palæontological history yet remains to be ascertained.

TRIMERORHACHIS Cope.

This genus presents the most imperfect vertebræ known in the order. It differs from all others, including Archegosaurus, in the lack of a distinct neural spine. Its humeri do not display condyles, but had cartilaginous articular surfaces. The teeth are rather small

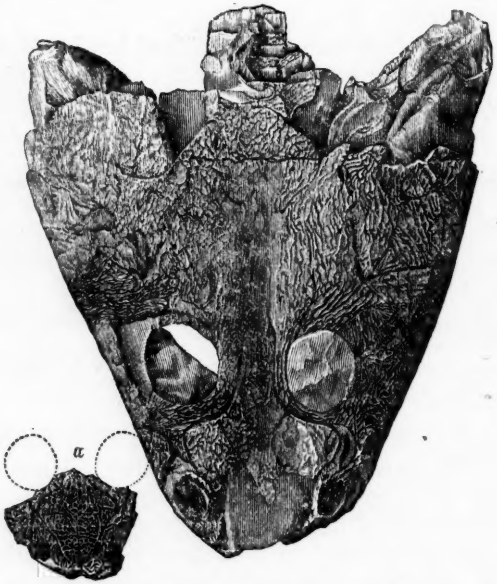



FIG. 3.—*Trimerorhachis insignis*, skull from above; one-half natural size. Smaller figure; muzzle showing sculpture and nares.

and of equal size, except a large one or two inside the external series near the anterior part of the mouth.

Two species are known, the *T. insignis* Cope, and *T. bilobatus* Cope, both from the Permian beds of Texas. Both were probably of slender proportions, and had short weak limbs.[1] The head of the *T. insignis* is wide, flat and rounded, and its superior surface is strongly wrinkled. The lyriform mucous groove does

[1] This proportion is not certainly known.

not extend behind the orbits. This was a very abundant species

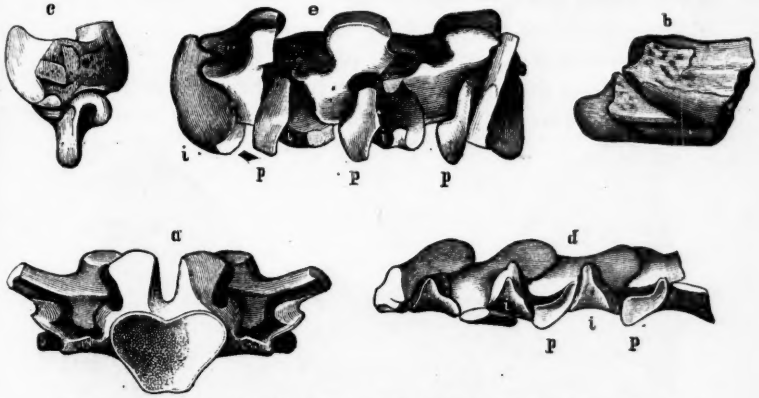



FIG. 4.—*Trimerorachis insignis* Cope; parts of skeleton, natural size. Fig. *a* basi-occipital, exoccipital and periotic bones, posterior view; *b*, angle of mandible, external view; *c*, the same, posterior view; *d*, part of vertebral column depressed by pressure, showing the intercentra (*i*) and the pleurocentra (*p*); *e*, a part of the vertebral column, oblique view, showing double neural arches and zygapophyses.

during the Permian period in Texas, and probably possessed aquatic habits.

ERYOPS Cope.

This genus is the best-known American representative of the Eryopidæ. This family includes also Acheloma, Anisodexis, and probably Zatrachys in America, and Actinodon in Europe. The last-named genus occurs in the Permian beds near Autun, in Central France, and has been well elucidated by the labors of Professor Gaudry of the Jardin des Plantes.

In Eryops the teeth are arranged much as in Trimerorhachis, in external series of nearly uniform size, with some large ones in the anterior parts of both jaws, a little within the external rows. As in that genus, the supra-temporal does not display a free external margin, as it does in Cricotus, and there is no angular process of the mandible. There is, on the other hand, no lyra. The intercentra and pleurocentra are much more robust than in Trimerorhachis. The neural spines of the vertebræ are large, and have expanded summits. The caudal vertebræ appear to have been very few, and to have been confluent into a short conical coccyx. The inferior elements of the pelvis are remarkably

heavy, the pubis being thickened in front, and truncated with a flat V-shaped face with reverted lip.

Three species of this genus are known. The most abundant in the Permian of Texas is the *E. megacephalus* Cope (Figs. 1 and 5–6). This is the largest American batrachian, the skull measuring a foot wide by eighteen inches long. It was very abun-

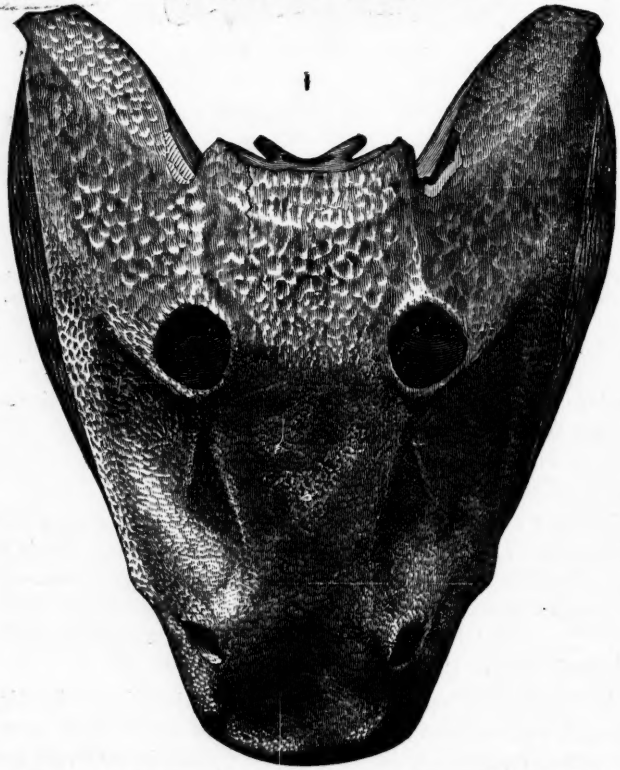
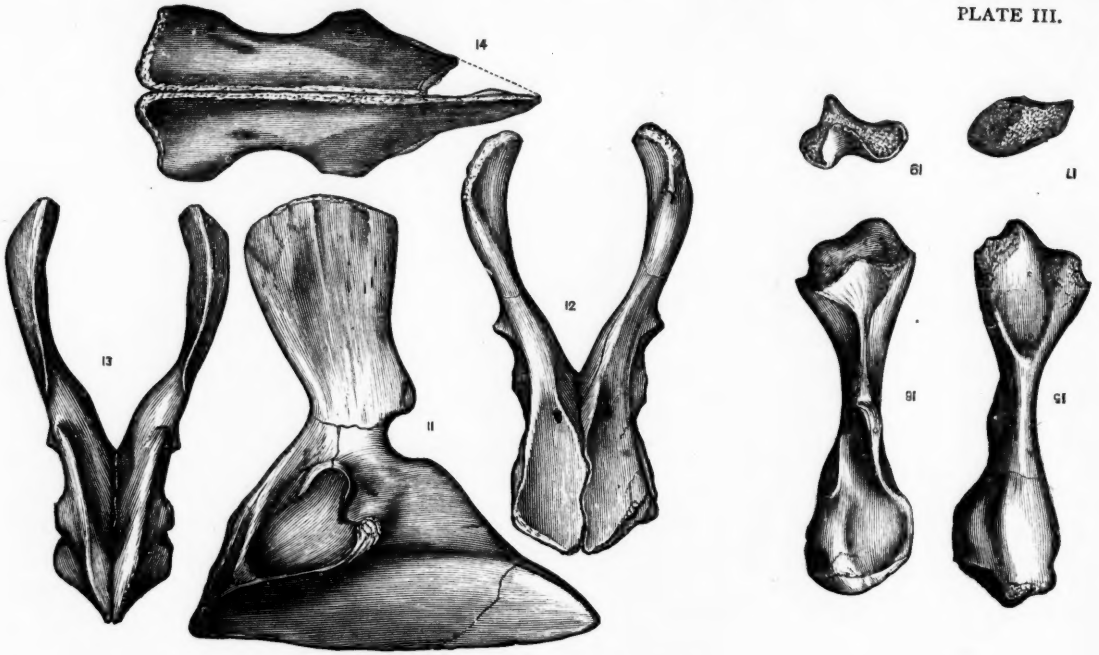


FIG. 5.—*Eryops megacephalus* Cope, skull from above, one-fifth nat. size.

dant, constituting with the reptilian genus Dimetrodon, the most prominent type of the Permian fauna in this country. The vertebral column is slender when compared with the size of the limbs, and especially of the head. The restoration of a species of European Labyrinthodon by Mr. Waterhouse Hawkins does not badly represent this species. The *E. reticulatus* Cope, is a much smaller species, and the sculpture of the skull is

PLATE III.




ERYOPS MEGACEPHALUS Cope. $\frac{4}{15}$

sharper and of a net-like pattern. The neural spines are not so much expanded at the apex. It has been found in the Permian beds of New Mexico. The *E. ferricolus* Cope, is a still smaller species, known from skulls from Texas. This, with the *E. megacephalus* and the *Trimerorhachis insignis*, were found by Mr. Jacob Boll, a naturalist of Dallas, Texas, who was a man of many accomplishments and an ardent explorer. He lost his life through

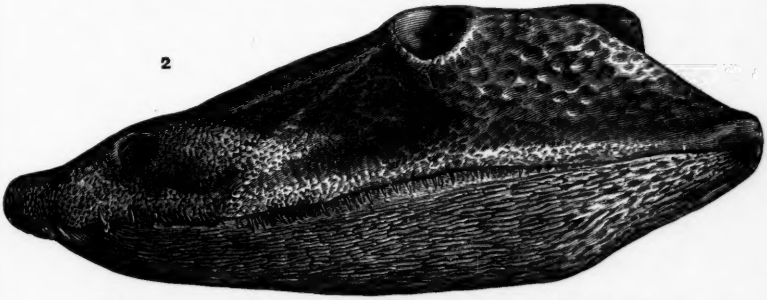



FIG. 6.—Side view of skull of *Eryops megacephalus*, one-fifth nat. size.

his indifference to his personal comfort while exploring the Permian beds at my instance.

ACHELOMA Cope.

This genus is allied to Eryops, and differs in two principal points. One of these is the absence of the lateral border of the cranial table formed by the external side of the *os intercalare* in Eryops and various other genera, the posterior outline of the skull being thus continuous. The other is the absence of the condyles of the humerus, a point in which it resembles Trimerorhachis. The vertebral segments are more robust than in Trimerorhachis, and less so than in Eryops; and it agrees with those genera in the absence of the mandibular angular process.

The only known species of this genus is the *A. cumminsi* from Texas. Its structure is pretty well known. It resembles in general the *Eryops megacephalus* with its small orbits and absence of lyrate groove, but is smaller and differs in various details. The skull is triangular, and measures a little more than seven inches long by five wide, and has an open honeycombed sculpture of the surface. The vertebræ and limbs are small for the size of the skull; and in the former the summits of the neural spine are not expanded.

ANISODEXIS Cope.

This genus differs from those previously described, in the inequality in the sizes of the teeth of the external series. Thus in the upper jaw there is a very large one in the position of a canine, and in the lower jaw there are some large ones near the symphysis. The neural arch of the vertebræ resembles that of the genus Acheloma. The *A. imbricarius* Cope, is the only known species, and is represented in collections by fragments only. The size of its skull is nearly that of the *Eryops megacephalus*. The sculpture of the superior surface of the skull is a coarse reticulation; that of the sides of the jaws is of an imbricate or shingle-like character. The limbs are unknown. The vertebræ do not exhibit an expansion of the summit of the neural spine. From the Texas beds.

ZATRACHYS Cope.

This genus was originally represented by a maxillary bone, which supports teeth of equal length, and whose surface is extraordinarily rugose. In the typical species, *Z. serratus*, the rugosities project in the form of teeth along the external alveolar border. Individuals with sculptured neural spines and dermal bones are referred here. The intercentra are much like those of Eryops and Acheloma.

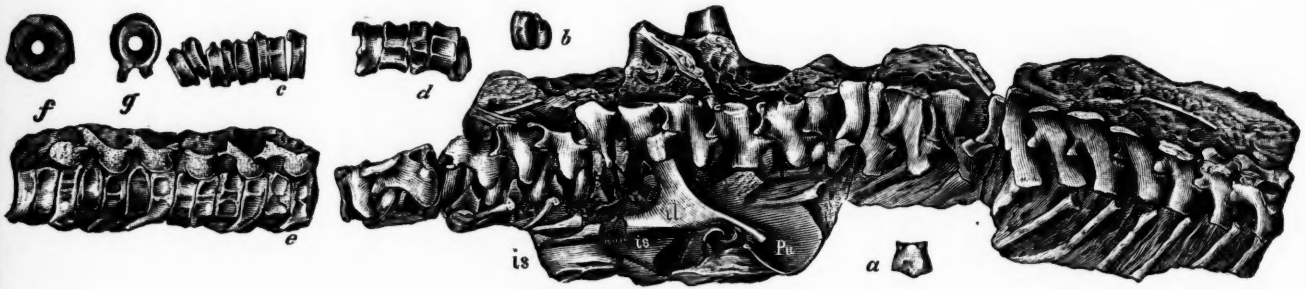
Two species are known, *Z. serratus* Cope, from Texas and *Z. apicalis* from New Mexico. In the latter the neural spines have much expanded apices, with sculptured superior surfaces. The animal may have been four or five feet in length, while the *Z. serratus* could not have exceeded three feet. Both species were well protected from the assaults of the cotemporary carnivorous saurians by their dermoössifications.

## EMBOLOMERI.

I proposed this order in 1880[1] to receive the family of the Cricotidæ. This remarkable form has been characterized in this journal[2] and elsewhere, by the complete development of its centra and intercentra, both of which form entire vertebral bodies which in pairs support single neural arches. No such character has been detected in the known divisions of the Stegocephali. Its

[1] AMERICAN NATURALIST, p. 610.

[2] Loc. cit. 1876, p. 405; 1878. p. 319. Proceedings Am. Philos, Soc., 1878, 523.




CRICOTUS HETEROCLITUS Cope. $\frac{2}{3}$.

characters were given as follows. I have not been able to expose the occipital condyle in my specimens.

Centra and intercentra subequally developed as vertebral bodies, a single neural arch supported by one of each, forming a double body. Chevron bones supported only by intercentra. Basioccipital vertebral articulation connected with the first vertebra by an undivided discoid intercentrum.

Thus the peculiarity of the vertebral column in general is carried into the cephalic articulation, and we have, instead of the complex atlas of the Rachitomi, a single body connecting the occipital condyle and first vertebra. This body represents, in all probability, *the single occipital condyle of the reptilian skull.* This part, as is well known, remains cartilaginous in the lizard long after the basioccipital is ossified,[1] and is a distinct element. In the Urodele Batrachia it appears, according to Albrecht, as the odontoid process of the *atlas.* The structure of Cricotus shows that it is a connate intercentrum. We have thus removed the last difficulty in the way of the proposition that the Reptilia are derivative of the Batrachia, viz., the difference in the cranio-vertebral articulation. But the former have not been derived from the Labyrinthodontia, as has been suggested, nor from the Rachitomi, but from the Embolomeri. The order of Reptilia which stands next to it is, of course, the Pelycosauria of the same period, which presents so many Batrachian characters, including intercentra, as I have for the first time pointed out in the paper above quoted.[2]

Professor Gaudry has been inclined to regard the bones which I have called intercentra as the true centra. But in the Embolomeri we have evidence that the pleurocentra are the true centra, since they assume the larger bulk, and support the neural arch and costal articulation, the intercentrum becoming more and more subordinate as we advance from the caudal series forwards. Moreover, the intercentrum bears the chevron bones in the Rhachitomi, and the Embolomeri, as they do in the cotemporary Pelycosauria.

I add to the ordinal characters above given, that the three pectoral shields of the Stegocephali are present here also.

[1] See Parker On the development of the skull of the Lizard, Philosophical Transactions, London, 1879.

[2] Intercentra remain in the cervical and dorsal series of Hatteria, and there is one at least in the cervicals of the Pythonomorpha.

Besides Cricotus, Fritsch describes a genus from Bohemia under the name Diplovertebron, which I suspect to belong to the Embolomeri.

In the family Cricotidæ the chorda dorsalis is persistent and large. The vertebral centra and intercentra are perforated so as to resemble some kinds of discoidal beads. They form a characteristic feature among the Permian fossils. The abdomen is protected by scales arranged in chevrons. There is a parietal foramen, and the supratemporal bone has a free external border like the squamosal of the crocodile.

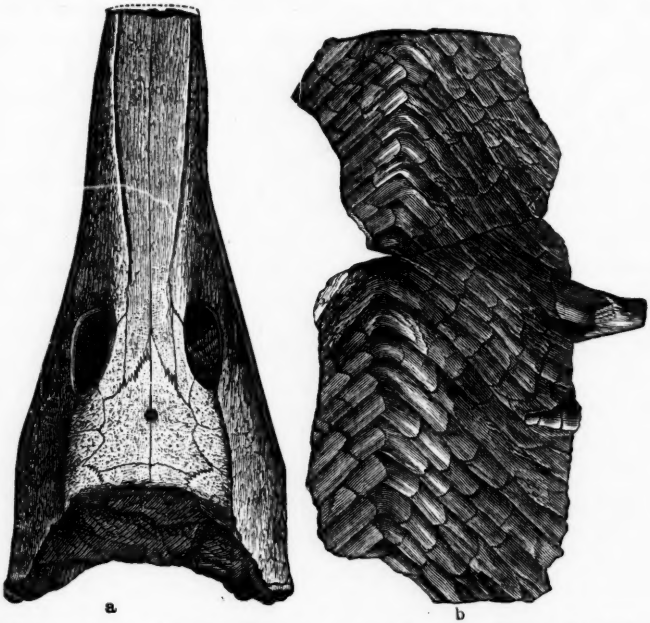



FIG. 7.—*Cricotus heteroclitus* Cope, the specimen figured on Plate v. Fig. *a*, skull from above, one-half nat. size, end of muzzle wanting; *b*, abdominal surface, showing scuta, distal extremity of femur and distal three phalanges of a digit, one-half nat. size.

CRICOTUS Cope.

In this genus the teeth are rather large, and are of subequal size in the external rows. The tail is long, and was apparently useful as a natatory organ. The terminal phalanges are obtuse as in salamanders, and without claws. The pelvis has the character of that of the Eryopidæ, but is less massive anteriorly. The

lower jaw has no posterior projecting angle. There are mucous grooves on the skull. The abdominal scales are oblong and in close contact with each other.

*Cricotus heteroclitus* was first found in Illinois, and afterwards in Texas. It is a more elongate animal than any of those described in the preceding pages, and it was furnished with short, rather stout limbs. It probably reached a length of ten feet, as my best preserved specimen, which is not the largest, measures about eight feet. It has an elongate triangular skull, eleven inches by six behind, with a singularly long, narrow, depressed muzzle, whose extremity overhangs the lower jaw completely. There are three pairs of mucous grooves; one is on each side of the roof of the muzzle, and runs out on the edge of the upper jaw, where it overhangs the extremity of the corresponding ramus. The second descends from behind the orbit, and running parallel to the edge of the upper jaw, joins the first at the usual position of a canine tooth in other forms. The third extends along the internal inferior edge of the mandibular ramus.

This species was probably aquatic in its habits. A smaller species, the *C. gibsoni*, has been described from Illinois. Its caudal vertebræ are of more elongate, cubical form than those of the *C. heteroclitus*.

## EXPLANATION OF PLATES.

### PLATE II.

*Eryops megacephalus* Cope, vertebral column, one-fourth natural size, the upper figure from the left side, the lower figure from below. The four sections of the column represented are parts of the same individual.

### PLATE III.

*Eryops megacephalus* Cope, pelvic arch and femur, four-fifteenths natural size, belonging to the individual figured in Plate II. Figs. 11–14 pelvis; 11, left side; 12, front; 13, posterior view; 14, from below. Figs. 15–19, femur; 15, anterior view; 16, posterior view; 17, proximal view; 19, distal view.

### PLATE IV.

*Trimerorhachis insignis* Cope, part of vertebral column flattened by pressure, of probably one individual, natural size. The upper figures (except *b*) from the right side; the lower (except *d*) from below. Figs. *a–d*, atlas and axis, the former with double intercentrum; the latter with single intercentrum. Fig. *b*, anterior view; Fig. *d*, posterior view.

### PLATE V.

*Cricotus heteroclitus* Cope, part of skeleton of one individual, excepting Figs *f* and *g*, two-fifths natural size. The vertebræ on the larger block include the posterior extremity of the dorso-lumbar series of the specimen as preserved, viewed partly from above. Fig. *a*, first cervical intercentrum, anterior face; *b*, the same attached to front of first cervical centrum, lateral view; *c*, four cervical centra separated by intercentra, partly from below; *d*, *e*, caudal vertebræ from below; caudal vertebræ from right side. Figs. *f* and *g*, specimens of the same from Illinois, anterior views; *f*, a dorso-lumbar intercentrum; *g*, a caudal intercentrum with bases of chevron bone; all two-fifths natural size.

# EDITORS' TABLE.

EDITORS: A. S. PACKARD, JR., AND E. D. COPE.

—— The first and hasty conclusion of many people on the perusal of Darwin's Origin of Species was, that the populations of the earth, including ourselves, are the food for the mills of unconscious and implacable forces, or at best are the sport of aimless chance. And so long as all evolution was supposed to be included in the two words "heredity and natural selection," there was good ground for pessimism, and even despair. It is a fact that in the early stage of thought on this subject, teachers as well as scholars underrated the importance of the question of the origin of variation, or the "origin of the fittest," although it had been publicly discussed in France a third of a century earlier.

The laws of mechanical evolution which are adduced to explain the "origin of the fittest;" do they give any relief to anxious humanity from undiscriminating domination of "the God of Forces?" The very term, "mechanical evolution," would seem to preclude any opportunity for the element of personality either as author or director. The pessimist and the fatalist may still apparently claim the field. But the nature, and hence the origin, of "the fittest," must be thoroughly understood before such judgment can be pronounced on the order of things.

With the advent of sensibility came pleasure and pain. Pessimism is the belief in the *reign of suffering*. On the other hand hedonism believes, if not in the reign of pleasure, at least in the reign of the greatest happiness to the greatest number. Do sensitive beings walk open-eyed into pain or pleasure once known, without fear of one or anticipation of the other? Every one knows to the contrary. Memory has been the teacher of the ages, so that the avoidance of pain and the pursuit of pleasure has been the business of living things since the dawn of consciousness and the existence of memory. It is more than probable that these prime movers of the universe have directed the mechanical forces into profitable channels, and have converted them to their use. More than this, mechanical evolution means the development of the machine that directs other machines, the brain, and the mind. Hence mechanical evolution is the evolution of intelligence. Of course the lessons of experience are in part lessons of pain, and beings that cannot act in accordance

with lessons sufficiently learned, will experience a maximum of suffering, and may have foundation for a private stock of pessimism of their own. But a tolerance of suffering is of various duration, and sooner or later intelligence will have its beneficent way. And as "knowledge is power," it results that the evolution of the living world and of men, has been and will be very much as they have it, and enlightened intelligence, well lived up to, has always resulted in a minimum of pain.—*C.*

—— The numbers of the AMERICAN NATURALIST for 1883 were issued at the following dates: January, Jan. 5; February, Jan. 31st; March, Feb. 21st; April, March 15th; May, April 18th; June, May 17th; July, June 20th; August, July 16th; September, Aug. 15th; November, Oct. 19th; December, Nov. 28th.

——:o:——

## RECENT LITERATURE.

HATTON AND HARVEY'S NEWFOUNDLAND.[1]—This is a successful account from historical, physiographic, ethnographic and economic points of view of the first English colony, and the last to be developed. It is the joint production of a resident on the island, Rev. Mr. Harvey, who with general culture and an intimate knowledge of the land and its inhabitants, unites a hearty appreciation of science, and is well known for the interest he has taken in the natural history of the Newfoundland seas; and of Mr. Hatton, who has rewritten and edited the whole work. For our part we do not see but that Mr. Harvey was quite competent for this task both as a writer, observer and collector of the facts. However that may be, the result is an authoritative, accurate, pleasantly written and timely manual of Newfoundland, with excellent full-page illustrations and others in the text. The map should have been a much better one; otherwise we have little fault to find with the volume.

The history of Newfoundland has been a peculiar one. The authors say it presents the British government at its worst and its best. How the "worst" could have been much worse, and how bad the "best" has been, is clearly brought out, and is an interesting study in sociology. The dominance of selfish greed on the part of a few British merchants, and the absence and entire lack for years of even rational and humanitarian feelings on the part of the mother-country, shows how many savage traits survived in the Anglo-Saxon race, of the best specimens, a century

[1] *Newfoundland. Its History, its Present Condition, and its Prospects in the Future.* By JOSEPH HATTON and the Rev. M. HARVEY. Reprinted from the English edition; revised, corrected and enlarged. Illustrated. Boston, Doyle & Whittle, 1883. 8vo. pp. 431.

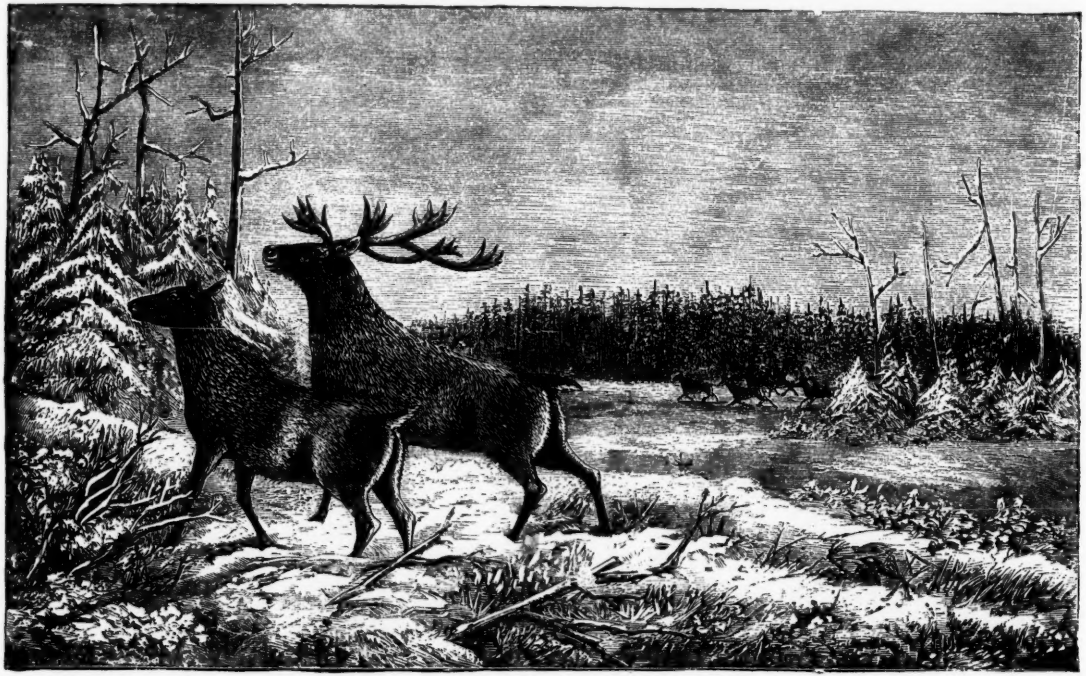
ago. Perhaps less consideration was shown to the incipient colony than the codfish—the white of the Newfoundland egg—bestows upon its own spawn. For not content with leaving the infant colony to nature, the mother-country proceeded to dwarf and mutilate it, and so retard its development that it is least in the list of dependencies of the British Empire.

How this was done, and how fair are the future prospects of the colony, the reader may find in the first part of the book itself. The second part treats of the physical geography and topography. There is much more arable land, valuable forests and a much milder climate in Southwestern and Western Newfoundland than is ordinarily supposed. Even the vicinity of St. Johns has a much milder winter climate than that of Montreal, the thermometer scarcely falling below zero; on the other hand the northeastern coast has a subarctic climate akin to that of Labrador.

The account of the geology of the island is mostly taken from the report of Mr. Murray, the director of the Geological Survey of Newfoundland, a work still going on. From the chapter on the aborigines it appears that they were the Bethuk tribe, a branch of the Algonkin race, and quite distinct from the Micmacs, now inhabiting Nova Scotia. So effectually were these hapless people exterminated by the settlers, that only a single skull remains on the island, which is now preserved in the local museum of St. Johns. The skill of some of the Bethuks in drawing is thus described on p. 176, where reference is made to a woman of the tribe taken prisoner in 1823: "She is described as six feet high, and having a fine figure; her complexion swarthy, like the Micmacs, and her features handsome. In her manners she was bland, affable and affectionate. When a pencil and a piece of paper were given to her, she drew a deer perfectly at a few strokes, and what was most surprising, she began at the tip of the tail." This woman and her two daughters were the last of the red Indians seen alive. She died at St. Johns of consumption, after six years of civilized life. The account of this tribe, their habits and language, has been prepared with evident care. It is interesting that no mention is made in the book of the Esquimaux. There are probably no traces of them in Newfoundland. This is rather curious, as Esquimaux have extended along the Labrador coast to the Straits of Belle Isle, the survivor having been seen by the writer of this notice at Caribou island, near the south-western entrance of the straits, in 1860. If there are yet to be found any trace of the Esquimaux in Newfoundland, we hope so competent a man as Mr. Harvey will look them up and report upon them.

Naturalists and sportsmen will find much to interest them in the chapters on the animals and plants, and that on Newfoundland as a sporting country.

As would be expected, Mr. Harvey has given a full account



On the Barrens. The Carribou, Buck and Doe.

of the giant squids which have shown such a partiality for the shores of this kraken-haunted land. His references to the great auk are interesting. We quote them all for the convenience of our ornithological readers. Whitbourne's account, entitled "A Discourse and Discovery of Newfoundland," was published on his return from the island, where he spent the summer of 1816. In this work he speaks of the "penguin," as big as a goose, which in vast flocks covered many of the small islands, and were met with in large numbers as far out as the Banks. "The last reference," says our authors, "is to the 'great auk,' now numbered among the extinct birds, but in Whitbourne's day it abounded in the Newfoundland waters. For the last eighty years not a single specimen of the great auk has been seen, and there are but a few skeletons of this singular bird in all the museums of the world" (p. 24).

Again after speaking, on p. 135, of Fortune bay, our authors state: "From Fortune bay there is a straight line of coast called the 'western shore,' which is upwards of one hundred miles in length, and terminates at Cape Ray. It is indented with numbers of small bays and harbors, the largest being La Poile and Rose Blanch bays. There are also numerous clusters of islands, such as the Penguin islands, so called from the multitude of birds of that name which were formerly seen there.

"The great auk was once found in myriads around the shores, but is now extinct everywhere, not a specimen having been found for the last fifty years. The little auk, the puffin, the common guillemot, called locally the 'murr and turr,' and the razor-billed auk are abundant. The great auk was a very remarkable bird, and deserves more than a passing mention. It must now be reckoned, like the dodo, among the things that have been, though in the sixteenth and seventeenth centuries it was to be seen in multitudes on the low rocky islands on the eastern coast of the island, and immense flocks of them were encountered by the mariners of those days as far out as the Banks. Now the discovery of a single living specimen, or even of a skeleton, would be hailed as a most fortunate event. The last auk was shot on an isolated rock of the south coast of Iceland. in 1844, and is now in the museum of Copenhagen. In all the museums of Europe and America there are only seventy-two specimens of the bird. Three of these were found on Funk island, off the north-eastern coast of Newfoundland in 1864. They came into the possession of Bishop Field, who forwarded one to Agassiz, another to Professor Newton, of Cambridge, and the third ultimately reached the British Museum, where there is but one other specimen, brought from the Orkneys in 1812. Numerous bones of the great auk have been found on Funk island, and a careful search might discover many perfect skeletons. The great auk was larger than a goose. Its wings were very small, and not constituted for flight,

but were admirable paddles in the water, enabling the bird to move about even more swiftly than the loon. The legs were extremely short but powerful, and placed so much posteriorly that in resting on the rocks the birds assumed an upright attitude, the whole of the leg and toes being applied to the surface. It was a native of the northern hemisphere, the penguin being its relative in the southern. The causes of its extermination are not difficult to discover. Its short wings and peculiar conformation rendered it helpless on the land; while its flesh and feathers were so valuable as to invite the rapacity of man. There were few suitable breeding-places, and when these were invaded it could not fly elsewhere, and had no choice but to die. In the 'struggle for existence,' to which nature subjects all her animated productions, such a bird as the great auk must perish early. It must have been a curious sight, two hundred years ago, to see these wild, lonely islands, their coasts literally swarming with these strange birds, as they waddled slowly about in an erect position, with their broad webbed feet and short wings, resembling the flippers of a seal. They were the connecting link between the fish and bird, partaking of the nature of both. The *English Pilot* for 1774 thus refers to them: 'They never go beyond the Banks as others do, for they are always on it or within it, several of them together. They are large fowls about the size of the goose, a coal-black head and back, with a white spot under one of their eyes, which nature has ordered to be under their right eye, an extraordinary mark. These birds never fly, for their wings are very short, and most like the fins of a fish, having nothing upon them but a sort of down and short feathers.' Not only were the crews of the fishing vessels of those days in the habit of consuming vast quantities of these birds' flesh, but they were accustomed to salt down many tons of them for future use. The merchants of Bonavista and other places were in the habit of salting and selling them, in the winter season, instead of pork, to the fishermen. The sailors used to land on the islands where they bred and fill their boats with the plump unwieldy birds (which on land could make no effort to escape), driving them, according to Whitbourne, on board by hundreds, or knocking them on the head with sticks. They feasted on their eggs and even burned their bodies for fuel in order to warm water to pick off the feathers, which were very valuable. After slaughtering them they sometimes shut them up in stone enclosures in order to have them ready when wanted. It is not wonderful that under such circumstances the great auk has been completely exterminated."

We wish the Penguin islands had been indicated on the map, and also the Funk islands, which we suppose to be the Fogo island. It is to be hoped that Mr. Harvey may elicit more information regarding the former existence of the great auk, though without doubt it ranged along the southern coast of Newfound-

land, Nova Scotia, and extended as far south as Cape Cod, as its bones are found in Indian shell-heaps at Ipswich, Mass., as well as the coast of Maine, and it was noticed by Josslyn, who called it the "wobble" (AMER. NAT., Vol. I, p. 578).

The chapters on the fisheries, on Labrador, those on the agricultural and mineral resources, etc., are all to the purpose. The best game animal is the caribou, which still in vast herds traverses the island in periodical migrations from north to south; the moose is still common, and there is good salmon fishing. The accompanying plate is a fair sample of the illustrations.

When the railroad to Notre Dame bay shall have been completed, a new era in the prosperity of Newfoundland will be opened, and when the railroad to Cape Ray, connecting the short sea route, is built, it will doubtless be very popular, and confer great local benefits by bringing the island into daily communication with Europe and America.

WRIGHT'S ANIMAL LIFE.[1]—In preparing this work the author has kept in view the wants of a large class of persons who like to see good pictures of animals and to read anecdotes about them. The popular idea of an "animal" is a beast or quadruped, or a bird, or reptile, or fish. There are those still existing to whom an insect is an insect, but perhaps not an "animal;" coral polyps and the multitudes of species of worms and other invertebrates are as unknown to them as the inhabitants of the planet Mars. Such persons were "brought up" on Goldsmith's Animal Kingdom, and when they buy for themselves or their children an Animal Kingdom, they want a modern Goldsmith. In other words they desire and expect to buy a bibliothecal Noah's ark with all its animals, which is well known were confined to such terrestrial forms as the celebrated voyager and his limited family could conveniently gather when their time was not otherwise engaged in preparing for their momentous voyage. The innumerable creatures of the seas through which the Noachian craft leisurely ploughed, were regarded with as little interest by the early voyagers (who soon became sick of the sea and all that belonged to it) as the general reader of to day looks upon Porifera, Cœlenterates, Echinoderms, Vermes, Brachiopods, Polyzoa or Tunicates. They are to him little more than names of illy-understood groups which he supposes to be of but little importance, whereas if it had not been for the worms we should have had no vertebrates at all, much less readers of an "Animal Kingdom."

Professor Wright has shrewdly adapted his book to this class of readers. He begins with mammals, then takes up the birds, and devotes two-thirds of the volume to these two classes. Considerable space is given to the reptiles, amphibians and fishes;

[1] *Animal Life. Being the Natural History of Animals.* By E. PERCIVAL WRIGHT. With Illustrations. Cassell, Petter, Galpin & Co., London, Paris and New York. 8vo, pp. 618.

sixty pages out of 618 are given to insects, and less than a hundred are reserved for all the other classes of the animal kingdom. The result is a well-written, profusely-illustrated and well-bound story book, which would make an admirable present to a lad interested in natural history. The value of such books is considerable, and the author has succeeded admirably in his task.

With much to commend in the treatment of his subject, we could, however, have wished for a more modern rendering of zoölogical science, especially those facts and laws relating to the struggle for existence, the relations of animals to each other and to their surroundings, as well as protective mimicry and the like topics. It is evident that the author has not been inoculated with the ideas and discoveries of modern biology; hence there is yet room for a skilfully written popular sketch of creation.

The author deprecates any criticism from specialists, so that fault-finding with his classification would be ungracious, though we must say that his arrangement of the insects, the Crustacea and Mollusca is unnecessarily old-fashioned. The average reader would find the work just as interesting if it had been in this respect made more in accordance with modern views.

The book is, however, a very entertaining one, with one or more well selected illustrations on nearly every page, and the stories are well told, so that the publishers may feel well satisfied with the way in which the author has accomplished what is, at best, a difficult task.

CHRIST'S FLORA OF SWITZERLAND AND ITS ORIGIN.[1]—This important work, which we have received through the kindness of the author, is one that we think destined to attract much attention. It is addressed not only to professional botanists but to cultivated people everywhere. Many Americans visit the little republic every year, led by its unequaled natural attractions. To such this book will prove invaluable. It is not a flora in the commonly accepted sense, that is, a list and description of all the plants of the region. On the contrary, it is an extended and painstaking treatise on the phyto-geography of the country; the origin, history and development of the vegetable growth.

The author has given many years of assiduous labor to the work, and writes not only with polished grace but with evident devotion. In fact, we have found ourselves quite carried away by some of his graphic descriptions.

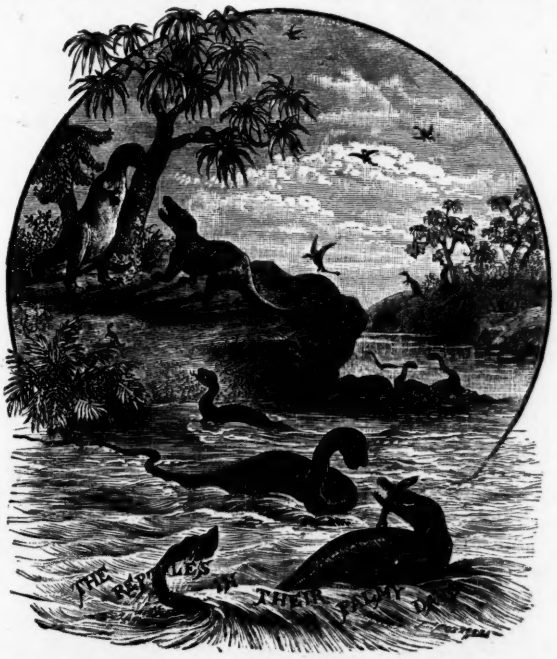
The author treats minutely of the zones of distribution and the causes which act upon them, and one who reads it carefully can hardly fail to acquire increased and useful information on a great variety of botanical subjects. Accompanying the work, which is one of 571 pages octavo, are five beautiful maps in color, showing vegetable distribution, and four full-page illustrations of char-

[1] *Flore de la Suisse et ses origines.* Par le Dr. H. CHRIST, Bale.

acteristic regional plants. It is a real treat to look over a book so entertaining in itself and so sumptuously prepared. The indices, those all-important adjuncts of any scientific work, not only include the names of plants, but of the insects visiting them, and of localities. We most heartily commend the volume to our fellow-workers.

We might add that we know from experience that Dr. Christ is an excellent collector. He is now especially interested in the genus Carex and in Coniferæ, and desires to exchange with American botanists. Those who are fortunate enough to effect an exchange with him will get more than an equivalent for what they send in varieties from the Alps superbly prepared.—*W. W. Bailey.*

Buckley's Winners in Life's Race.[1]—We may say without qualification that this is the most successful attempt at a popular



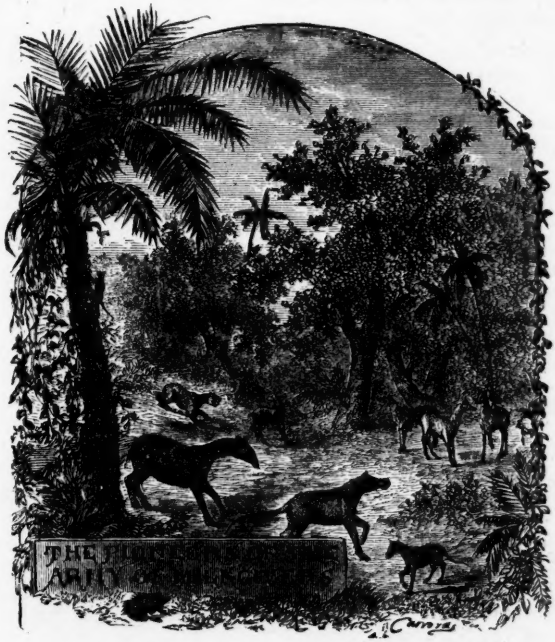
sketch of modern zoölogy with which we are acquainted. The authoress has been fortunate in her sources of information and in her artists. She wields an easy and graceful pen, has the art of

[1] *The Winners in Life's Race, or the Great Back-boned Family.* By Arabella B. Buckley. New York, D. Appleton & Co., 1883. 12mo, pp. 367. $1.50.

THE EARLIEST KNOWN WATERBIRDS

vivid description and good generalizing powers. It is, moreover, a successful application of the principle of evolution, the theory forming the warp and woof of the work, and thus according with nature, while a wholesome and reverent tone pervades the pages. It is just the book to use in schools as a reader, or for collateral reading by classes in zoölogy.

The book is a continuation of Miss Buckley's earlier little volume entitled "Life and her Children," to which we shall hereafter draw attention. Taking up the thread dropped at the close of the



book just named, the authoress shows that while the world before the advent of fishes and other back-boned animals was teeming with life, worms, mollusks, crustaceans, insects, etc., yet the world could not make the fullest use of them, and therefore life devised a plan of structure where her forms should reach their highest expression, and which should take the lead all over the earth, dominating the regions of the air, the earth, as well as the water.

Beginning with the lancelet, and considering the sea-squirts or ascidians, two types lying on the threshhold of "back-bone life," she then describes the lamprey, then the old-fashioned "ganoid" fishes, and shows how they led the way to the incoming of the

amphibians, the reptiles, birds, the bony fishes, and lastly the mammals, with man, "the last and greatest winner in life's races."

The story is most skillfully told; it will charm the grown-up naturalist, and, as we have reason to know, interest an intelligent lad. The wood-cuts, some of which we reproduce, are by Mr. Carreras, and are geological restorations of unusual excellence. The frontispiece, illustrating the phosphorescent fishes, is by Mr. Smit. The authoress acknowledges the aid of Professor W. Kitchen Parker, Mr. Alfred R. Wallace and others, and her work while very readable is also reliable. We can see no points open to serious criticism.

BAUME'S ODONTOLOGICAL RESEARCHES[1]—This is not a systematic work on odontology, but a series of chapters on the general nature of teeth, containing the results of the author's original researches, and well illustrated by numerous wood-cuts. The first part is an attempt at a developmental history of the teeth. After stating the nature of the theory of natural selection, the author enters into an elaborate general description of the dermal armor of vertebrates, which is followed by descriptions of the placoid scales and teeth, and the teeth of other fishes, as well as those of amphibians and reptiles, and a section on the development of mammalian teeth. The following subjects are then discussed: the reduction of the teeth; the strengthening in their sockets of mammalian teeth, especially the relations between the teeth and bones; the hard tissues of teeth; the physiology of dental substance; the ever-growing teeth (wurzellose zähne) of mammals, *i. e.*, those with an exposed pulp, as the incisors of rodents, and the tusks of the elephant; the formation of the crown and root; the specialized teeth; the transformation of tooth-forms; the milk-teeth; the diphyodont semblance of mammals; the third dentition; the typical number of mammalian teeth of the present time; the last rudiments of lost teeth in the jaws of other mammals, and finally he discusses teeth and their organism.

The second part is of more practical interest, discussing the defects of the hard parts.

RECENT BOOKS AND PAMPHLETS.

*A. S. Packard, Jr.*—American Science Series, Briefer Course, Zoölogy. H. Holt & Co. 1883. 12°, pp. 334.

*Cragin, F. W.*—A contribution to the History of the Fresh-water Copepoda. Ext. Trans. Kan. Acad. Sci., May, 1883. From the author.

*Harger, Oscar.*—Report on the Isopoda. Bull. Mus. Comp. Zoöl., Vol. XI, No. IV. Results of dredging on E. coast U. S., 1880. Sept., 1883. From the author.

*Agassiz, Alex.*—The Porpitidæ and Velellidæ. Mem. Mus. Camp. Zoöl., Vol. VIII, No. 2. Surface fauna of the Gulf Stream. July, 1883. From the author.

*Kunz, G. F.*—American Gems and Precious Stones. Ext. from "The Mineral Resources of the U. S." Washington, 1883. From the author.

[1] *Odontological Forschungen.* Von ROBERT BAUME. Leipzig, Verlag von Arthur Felix, 1882. 8vo, pp. 307, 191.

*Williams, Alo.*—The Mineral Resources of the United States. Washington, 1883. From the author.

*Clarke, W. H.*—Horses' Teeth. N. Y., W. R. Jenkins. From the publisher.

*Shufeldt, R. W.*—Observations upon the Osteology of *Podasocys montanus*. Ext. Jour. Anat. and Physiology. Also, Observations on the Habits of the American Chameleon (*Anolis principalis*). From the author.

*Barrois, Chas.*—Recherches sur les Terrains Anciens des Asturies et de la Galice. Planches et Texte. Lille, 1882. From the author.

*Powell, J. W.*—Annual Report of the Secretary of the Interior for the year ended June 30, 1881, Vol. III. Washington, 1882. From the department.

*Winchell, Alex.*—World-life, or Comparative Geology. Chicago, Griggs & Co., 1883. From the publishers.

*Worthen, A. H.; St. John, Orestes; Miller, S. A.*—Geological Survey of Illinois, Vol. VII. Geology, by A. H. Worthen; Palæontology, by A. H. Worthen, Orestes St. John and S. A. Miller. Boston, May, 1883. From A. H. Worthen.

*Fewkes, W.*—On a few Medusæ from the Bermudas. Bull. Mus. Comp. Zoöl., Vol. XI, No. 3. Aug., 1883. From the author.

*Ashburner, Chas. A., and Winslow, A.*—New method for estimating the contents of highly plicated Coal beds, as applied to the Anthracite fields of Pennsylvania.

*Pohlman, Jul.*—On the Origin of the eastern end of Lake Erie. From the author.

*Scudder, S. H.*—The fossil White Ants of Colorado. Ext. Proc. Amer. Acad. Arts and Sciences, 1833. From the author.

*Clevenger, S. V.*—Report on the Recent Appearances observed post mortem in a case of Delirium Grave. From the author.

*Smucker, I.*—Mound-builders' Works, near Newark, Ohio. From the author.

*Dupont, M. E.*—Observations sur une note récente de M. P. J. Van Beneden concernant la découverte des ossements de Bernissart. Ext. Bull. Acad. Roy. de Belg., 1883. From the author.

*Ritch, W. G.*—Illustrated New Mexico, 1883.

*Nipher, F. E.*—On certain Problems in Refraction.

——Magnetic Survey of Missouri. Fourth Annual Report, 1882. Both from the Trans. St. Louis Acad. of Science, Vol. IV.

——The American Trotting Horse.

——On a new form of Lantern Galvanometer. Both from the Amer. Jour. Sci. and Arts.

——Choice and Chance, a lecture delivered before the Kansas Acad. of Science, 1880. All from the author.

*Wadsworth, J. L. R., and Nipher, F. E.*—The Tornado of April 14, 1879. Ext. Trans. Acad. of Sci. St. Louis, Vol. IV. From the authors.

*Geikie, Arch.*—On the supposed Pre-cambrian rocks of St. David's. Ext. Quarterly Journ. Geol. Soc., Aug., 1883. From the author.

*Agassiz, Alex.*—Selections from Embryological Monographs. II. Echinodermata. July, 1883. From the author.

*Crosby, W. O.*—Origin of Continents. Ext. Geol. Mag., Decade II, Vol. X, June, 1883.

——On the Mountains of Eastern Cuba.

——On the Classification and Origin of Joint-structures. Ext. Proc. Bost. Soc. Nat. Hist., 1882. All from the author.

*Coppi, Fran.*—Osservazioni Malacologiche circa la *Nassa semistriata* e *N. costulata*. From the author.

*Baird, S. F.*—Annual Report of the Board of Regents of the Smithsonian Institution. Washington, 1883. From the department.

*Hayden, F. V., St. John, O.; Packard, A. S., Jr.; White, C. A.; Scudder, S. H.; Shufeldt, R. W.*—Twelfth Annual Report of the U. S. Geol. and Geog. Survey of the Territories. Rep. of Progress of the Exploration in Wyoming and Idaho. Part I. Palæontology, by C. A. White; Geology, by Orestes St. John; Zoölogy, by A. S. Packard, Jr.

*Hayden, F. V., Holmes, W. H., Peale, A. C.*—Ditto. Part II. Yellowstone National Park.

*Hayden, F. V.*—Maps and Panoramas of Twelfth Annual Report U. S. Geol. and Geog. Surv. Washington, 1883. From the department.

*Calvin, S.*—On the fauna found at Lime creek, Iowa. Ext. Amer. Jour. Science. From the author.

——:o:——

## GENERAL NOTES.

### GEOGRAPHY AND TRAVELS.[1]

AMERICA.—The Athabasca fur district, acccording to the Rev. E. Petitot, contains large areas of fertile ground capable of supporting a considerable population. One of these areas is the delta formed by the mouths of the Athabasca and Peace rivers, at their entrance into Athabasca lake. Between Egg river, by which the Peace river enters the lake, and Duck portage on the Slave river, is an immense plain, intersected by rivulets and by the openings from the Peace to the Slave rivers. This delta is comparable in fertility with that of the Comargue in Provence. Besides these deltas, the zone of natural prairie along the Rocky mountains from the Upper Saskatschewan to the Hay river, comprises every condition necessary for settlement.

The Athabasca rises in a little lake at the foot of Mt. Brown (16,000 feet). Its course before entering Athabasca lake must be 500 to 600 miles. The passage between Athabasca and Great Slave lakes, known as Slave river, is 240 miles long, while the Mackenzie, as the river is called between the Great Slave lake and the ocean, is about 1045 miles in length. On the Athabasca proper, near the confluence of the Clear-water, is a chain of little volcanic cones, and in this district "boucanes," or vents, giving forth smoke and fire, abound. These are usually found on the line of deposits of incompletely carbonized lignite. Where the Athabasca meets Birch or Bark mountains there is a cañon some twenty-five to twenty-eight leagues long, called the Great Rapid, followed by several other rapids. There is no fall, but a rapid, flat sheet of water, obstructed by enormous boulders. At this part erosion has detached from the rocks a multitude of lenticular concretions varying from the size of a button to that of a large boat. Fossils abound in the shelly limestone that alternates with the bituminous schists.

Lake Athabasca, though the smallest of the great chain of lakes that stretches from the Gulf of St. Lawrence to the Arctic, is 230 miles long by twenty wide. Its bed is deep, and its banks granitic on three sides; but there are sandy or muddy deposits on its southern shore. Its northern side is wholly sterile and rocky, affording food to nothing but caribou.

M. Petitot's paper and map correct four geographical errors.

[1] This department is edited by W. N. LOCKINGTON, Philadelphia.

Lake La Rouge, which drains into the Churchill, but was said to also open into the Beaver river, is shown not to do so, as the La Plonge river, though it rises near Lake La Rouge and falls into the Beaver, does not take the waters of the lake. Lake Wollaston does not, as was supposed by Hearne, communicate with Lake Athabasca. The most southerly stream that flows into the latter lake rises at the foot of Beasts mountain, close to Lake Wollaston, but has no communication with it. Great Bear lake, supposed by Sir J. Richardson to have three outlets, viz., Bear Lake and Hareskin rivers, entering the Mackenzie, and Beghula river, flowing to the Arctic, has really but one—that which bears the same name. The Hareskin river flows out of the Wind lake near Smith bay in Bear lake, and the Beghula or Anderson rises in a little lake at the foot of Mount Ti-dépay, quite to the north and some distance from Bear lake. The fourth error regards the famous great lake of the Eskimo, now known to be considerably smaller than was supposed. This lake was believed to have various openings into the Arctic, besides one in the mouths of the Mackenzie and another in the Anderson. It is now known that this lake has but one outlet, the "Natowdja," which flows direct into the Arctic ocean. M. Petitot represents the Beaver and Unknown rivers, which enter Lake Athabasca from the south, as of rather large size, and as rising in lakes near the drainage of the Churchill.

The Indians of the Athabasca and Mackenzie districts, chiefly Chipewyans and Crees, are so reduced that they barely reach 6000.

A Visit to Stanley's Stations in Africa.—Mr. H. H. Johnston gives (Proc. Roy. Geog. Soc., Oct., 1883) an interesting account of his trip up the Congo to Mr. Stanley's stations. Mr. Johnston first made an excursion from Underhill, a Baptist station on the Lower Congo, to Pallaballa. The villages upon the Lower Congo have a comfortable look, and the natives raise maize, cascada, limes, sometimes oranges, papaws, the passion flower, which gives the fruit known as maracuja or grenadilla, and bananas and plantains. The plots of garden are marked out by a line of bast tied from peg to peg, just as our gardeners do with a string; hens are kept in hen-coops made of withes and grass, and goats and sheep are housed in a shanty of palm-fronds. The Central African sheep have short hairy coats, and the rams have also a silky mane from chin to stomach. Here and there may be seen a black, high-shouldered bullock stalled in a not ill-fashioned manger of palm-fronds.

The houses are built neatly and well, and are usually raised a foot above the ground on a platform of beaten earth. They are made of stout poles, with a wide-spreading roof having a long pole in the center, and covered with thin laths and dried grass. The roof extends some feet beyond the house all round, and is

prolonged in front into a kind of veranda, where the inmates of the dwelling pass most of their time.

The scenery on the road to Pallaballa, as usual in the cataract region of the Congo, consists of grass-covered hills alternating with fertile valleys. Pallaballa is on the crest of a hill 1600 feet high, and is a station of the Livingston Inland Mission.

Many Portuguese words are introduced into the dialect. A prevailing superstition among the natives causes some person to be considered as *udokki*, or devil-possessed, whenever any one dies. The *udokki* must take the *casca* poison, which is, however, usually administered so as to be a strong emetic, under the notion that he will "bring up" the devil.

The young men undergo an initiation of six months, during which time they are called *inkimba;* do not wash any part of their bodies, and are chalked all over a ghastly white. The initiation has three or more stages. The *nganga*, or medicine-man, teaches them a distinct language, which is never taught to females.

Returning to Vivi, Mr. Johnston walked thence for Isangila (fifty-eight miles), a station facing the rapids of the Congo. The next station, Manyanga, is eighty miles further, and Leopoldville, on Stanley Pool, is ninety-five miles beyond Manyanga. The scenery between Manyanga and Leopoldville is beautiful. Stanley Pool is an expansion of the Congo, about twenty-five miles long by sixteen broad, with seventeen large islands and many floating islets formed of masses of aquatic vegetation. Around the cup-like basin of the pool is an incomplete rim of picturesque mountains, not rising above 4000 feet. The scenery is especially beautiful at the northern end, where the Upper Congo enters the pool. Further south the banks are lower, as the mountains recede from the water. "Brazzaville," or rather Mfwa, has no advantages as a site, and is a small, low-lying native village. Opposite to it a curious cliff, apparently of red clay, rises some fifty feet above the river. This is called Calina point, from Lieut. Calina, who was recently drowned in the dangerous current that sweeps around the promontory. This point belongs to the natives of a large village called Kinshasha, and these have hitherto refused to allow either Stanley or De Brazza to erect a station there. The latter, it is rumored, covets this point, and intends to fortify it, so that with it and with M.wa opposite he could close the exit from Stanley Pool to the Lower Congo.

From Leopoldville our traveler ascended to Bolobó, 250 miles farther up the river. Above the pool the Congo varies in width from 600 to 1000 yards. Msuata, 110 miles from Leopoldville, is one of the prettiest of Mr. Stanley's stations, and is surrounded by natives who are very cordial to Europeans. Farther on is Ganchu, the "pirates' village" of Stanley's first descent of the river—so-called through misconception of the peaceful intentions

of the natives. The Wabuma, a stream at its mouth as wide as the Thames at Westminster, flows, according to Stanley, out of a lake seventy miles long (Lake Leopold II), runs for a great part of its course nearly parallel with the Congo, then bends away and broadens greatly, and finally contracts at its mouth. The Quango is probably an affluent of the Wabuma. The Bayansi village at the junction of Wabuma and the Congo has compact, tidy-looking houses, some containing three rooms.

The principal tribes between Bólóbó and Stanley pool are the Batéké, the Bayansi, and the Wabuma. All seem to be comparatively recent arrivals. The first are resident colonists from the north-west, between the Ogowé and the Congo; the second come from the Equator and north-east, and are the great travelers and traders of the Upper Congo, while the third inhabit the lower course of the river of the same name. All are kindly, merry, and courteous in behavior, of splendid physical development, and possessed of great artistic power, as shown in the decorations (often indelicate) of their utensils and arms. They are fond of music, and from their five-stringed instruments draw many harmonies of plaintive tone and perfect rhythm. The languages are of the Bantu stock, and that of the Wabuma is strangely guttural. All have many words identical with the Kaffir tongues. Zanzibaris can often make themselves understood.

Asia and the Indian Archipelago.—Mr. H. O. Forbes has returned to London after five years of wanderings. He first visited the Keeling island in the South Indian ocean, and then, proceeding to Java, explored its western and southern districts, making numerous observations on the fertilization of orchids, etc. He then spent eighteen months in Sumatra, making botanical collections, ascending and measuring the highest peaks of the Barisan range, visiting the elevated plateau of Blalauw, and staying awhile with a pagan race inhabiting the Passoemah lands round the Dempo volcano. The customs of this people differ widely from those of the surrounding peoples, and Mr. Forbes found there two hideously visaged sculptured figures. He also visited the forest-living Kœboes, supposed to be the remnants of the indigenes. Afterwards, accompanied by his wife, he visited the till then unexplored Timor-laut, and lastly traversed the eastern part of Timor.

According to Mr. R. Lydekker, of the Geological Survey of India, the deepest by far of the Indian River valleys is that of the Indus below Bowanji in Gilgit. Between that place and the Darel district, Lt. Col. H. C. B. Tanner states that the Indus flows in a narrow gorge bordered by precipices 20,000 feet in height above the ocean level, the level of the waters being a little over 3000 feet, thus giving nearly 17,000 feet as the actual depth of the gorge. The occurrence of river gravels and honey-combed rock surfaces

many hundreds of feet below the present level proves that a great part of this gorge has been cut by the river itself.

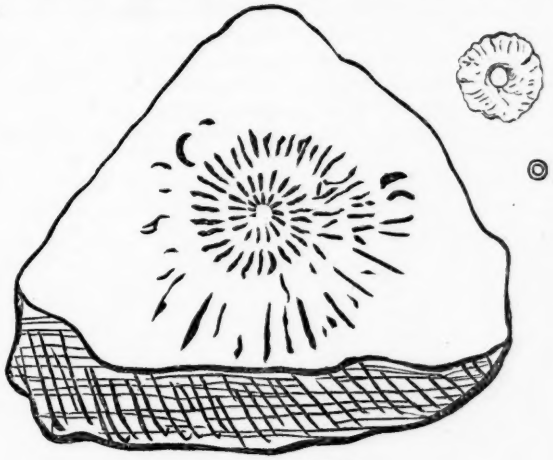
The lowest level of any Himalayan glacier is 9400 feet, at which point one of the glaciers about the Peak of Nanga-Parbat terminates, near the village of Tarshing. The most southern of the Mastagh or Kárákoram range (which contains the second highest known peak of the world, 28,000 feet) is covered with a complete network of glaciers, some of which (the Biafo and Bráldu glaciers) are only exceeded in size by the great Humboldt glacier of Greenland. The lowest limit of these glaciers is about 10,000 feet, and, contrary to what occurs in other parts of Káshmir, they descend quite into cultivated ground, and their terminal moraines are frequently covered with a thick growth of cypress.

GEOGRAPHICAL NOTES.—A letter from Mr. Stanley, dated July 14, reports the discovery of a new lake called Mantumba, and also the exploration of the course of the River Ikelembu, which is identical with the Malúndu, and is a broad navigable stream. Mr. Stanley expresses increasing surprise at the density of the population in the equatorial parts of the Congo basin, and estimates the inhabitants of that basin at forty-five millions.——Dr. Stecker has returned to Germany after five years' travel in Africa. During this period, beside his journeyings in company with Dr. Gerhard Rohlfs, he discovered, east and south of Abyssinia, about a dozen countries which had not previously been visited by any European. He was imprisoned as a spy by King Melelek, of Shoa, but was released through the intercession of Marquis Antinori.——The East Siberian branch of the Russian Geographical Society is exploring the vicinity of Lake Baikal, where rich remains of the stone age are found. The Valley of Tunka seems to have been an immense workshop for the fabrication of quartz, jade and nephrite implements. The Valley of the Angara consists of a succession of large plains separated by narrow gorges. The Valley of Tunka was occupied by a series of lakes in the Post-pliocene period. On the Steppe of Ust-Unga M. Agapitoff has found a spot where thousands of implements could be collected. Pieces cover the steppe over a space of more than twelve miles. The stone hatchets of the steppe are similar to those in use among the Chukches.——Great results may be expected from the proposed expedition of Col. Prejevalsky to Thibet. He will be absent two or three years, during which time he hopes to explore the country of the Si Fans, between Lake Kookoo-nor and Batung, to traverse Northern Thibet and, if possible, follow up the Brahmaputra.——The last census of Bohemia gave the number of Czechs as 3,470,252, that of the Germans as 2,054,174. The number of foreigners in Bohemia is only 80,236, and consists chiefly of Germans. The Czech nationality preponderates in the center of Bohemia, in some districts to the almost total exclusion of the German element, but in the border districts,

especially those of the north-west, the Germans preponderate. ——M. Lessup has written to the Russian Geographical Society that he has explored the Ongouz river, which was previously known only in the upper parts. Even the Tekkes did not know the route to the east of Mirza-chile.

## GEOLOGY AND PALÆONTOLOGY.

THE POWER OF MOTION IN CRINOID STEMS.—At the Soldiers' Home, near Dayton, Ohio, I found the stone here figured. Imbedded on its upper surface lay a coil of crinoid joints in such a way as to indicate that they had all once formed part of the same crinoid stem. Indeed, the former unity of the first 2½ coils is evident; but here we find traces of two coils, and a little farther out is seen a half coil of larger beads, however the parallelism of



Coil of Crinoid Joints.

the coils would indicate that these are only parts of the same stem, the intermediate parts having been removed and their connection broken.

The stone is of the Clinton group, but I cannot determine the species of the crinoid; although separate joints of the stem are extremely common, the crinoid heads are lacking. One thing is remarkable, the rapid increase in size of the joints of the column within 2½ coils, or not quite three inches, from $\frac{1}{16}$ of an inch to about four times this diameter. I figure the end disks, enlarged two diameters.

The column is disposed in a perfect and natural coil. It is not customary to find things so arranged in nature unless it is either a law of their growth or the objects have the power of volition and can place themselves in such a position at will. The first

case is not true here, because I frequently find a few continuous joints which do not show this coiled arrangement. It cannot be mere accident, since it is almost mathematically perfect, and any agency at work upon the animal after death, such as the rotary movement of water in a whirlpool, or the play of animals, might have twisted the crinoid about, but would not have formed a coil such as this. Hence, I conclude that it must have had the power of placing itself in this position at will, and that it was destroyed at a time when it had so disposed itself. The power of assuming the shape of a coil is quite a complex one, and necessitates a system of muscles capable of slight contraction along the whole extent of the column, and is generally correlated with power of motion in any direction, as in the bodies of snakes and the necks of swans.

So we may conceive the head of our crinoid as attached to this column and through it to some object on the bottom of the ocean; but it is not a flower dangling on its stem, dependent on the capricious flow of water and the accidental presence of animalcules for its food, but we may picture it as moving about in all directions, limited indeed by the length of its column, and thus securing its food. I have been quite lengthy in my description, but this may be excused if I have convinced my geological friends on this subject.—*Aug. F. Foerste, Dayton, Ohio.*

THE LOUP FORK BEDS ON THE GILA RIVER.—In his report on the Geology of New Mexico, to the Secretary of the Interior, by Dr. F. V. Hayden, in 1869, this eminent geologist described the Santa Fé marls in their principal physical features. In 1874, in my report to Capt. Geo. M. Wheeler, U. S. Engineers, I showed that this formation is a member of the Loup Fork division of the Miocene Tertiary, a conclusion clearly deducible from the remains of Vertebrata which it contains. An illustrated report on the latter was published in the fourth volume of the Report of the U. S. Geographical and Geological Survey W. of the 100th meridian, Capt G. M. Wheeler in charge (1877).

Since that time the writer has made several visits to parts of New Mexico not previously explored, and I am able to show that the Loup Fork formation has a much wider distribution in that territory than has hitherto been supposed to be the case.

In descending the Rio Grande, beds appear on the west side of the river, which strongly resemble those of Santa Fé. They extend along the eastern base of the Magdalena mountains, and as far south as Socorro, in considerable extent and thickness. South of Socorro they appear, but less extensively. The eastern part of the plain which lies between the Rio Grande and Mimbres mountains is composed of beds of this age where cut by the grade of the Atchison, Topeka and Santa Fé R. R. west of Hatch station. West of the Mimbres mountains the valley of the river of the same name is filled with débris of the bed of eruptive out-

flow which once covered the country as far as traversed by the railroad from Deming to Silver City. Its age I could not ascertain.

A great display of the Loup Fork formation is seen in the drainage basins of the heads of the Gila river. In traveling westward from Silver City, its beds first appear in the valley of Mangus creek, which enters the Gila from the east. Crossing the Gila, the mail route to the west passes through the valley of Duck creek, which flows eastwards into that river. Though bounded by eruptive hills and mountains, and their outflows, the valley was once filled with Loup Fork beds, which have been extensively eroded, the principal exposures being on the north side of the valley, forming the foothills of the Mogollon range. On the divide between the waters of the Gila and San Francisco rivers, the formation rises in bluffs of 300 feet elevation. The descent into the valley of the San Francisco brings to light a still greater depth of this deposit. The valley, which extends from the cañon which encloses the river south from the mouth of Dry creek, to the Tulerosa mountains on the north, and between the Mogollons on the east and the San Francisco range on the west, was once filled with the deposit of a Loup Fork lake. This mass has been reduced by the erosive action of the San Francisco and its drainage, to a greater or less extent, as it has been protected by basaltic outflows or not. When so protected, the river flows through comparatively narrow cañons. Where the outflow is wanting, the valley of the river is wider, and the Loup Fork formation remains as wide grassy mesas which extend to the feet of the mountain ranges.

The age of these beds would have remained problematical but for the fortunate discovery, by Mr. Robert Seip, of the skull of a species of rhinoceros of the typical Loup Fork genus Aphelops. It is apparently the *A. fossiger* Cope, a species abundant in the Loup Fork beds of Kansas and Nebraska. It was found near the mouth of Dry creek, in a conglomerate bed of the formation.

In the valley of the San Francisco, the Loup Fork beds reach a thickness of 500 feet, and consist of sand, clayey sand, soft sandstone and conglomerates of larger and smaller pebbles of eruptive material, having a near resemblance to those of the region of Santa Fé.—*E. D. Cope.*

On new Lemuroids from the Puerco formation.—The animals of the Eocene period, of the Adapidæ, may belong to the Lemuroidea, but the evidence which I have derived from the feet of Pelycodus[1] has led me to refer them[2] to the insectivorous division of the Bunotheria, to the neighborhood of the Tupæidæ and Erinaceidæ. At the same time I retained provisionally the gen-

[1] Report of U. S. G. G. Survey W. of 100th mer., G. M. Wheeler, IV, p. 140.

[2] Proceedings Academy Nat. Sciences of Philada., 1883, pp. 78–80.

era with three and two superior premolars in the sub-order Lemuroidea, although the foot structure of these extinct genera is yet unknown. I also inadvertently defined the Lemuroidea as having quadrituberculate superior molars, a character which I well knew to be wanting in various extinct and recent genera where they are tritubercular. Two families were proposed for the Eocene lemuroids, which are defined as follows:

Superior premolars three.....*Mixodectidæ.*
Superior premolars two.....*Anaptomorphidæ.*

The genera of the first named family are defined as follows:

I. Canine teeth large and lateral; well separated.

First superior premolar without internal lobe; superior true molars tritubercular with cingula.....*Tricentes.*

II. Canine teeth median in position or much reduced in size.

*a.* Last inferior premolar without internal tubercle.

Inferior premolars all one-rooted. Canine and incisor small.....*Necrolemur.*[1]
First premolar only one-rooted; canine small; incisor very large.....*Mixodectes.*[2]

*aa.* Last inferior premolar with internal tubercle.

A very large ? canine; first premolar only one-rooted.....*Microsyops.*[3]
A very large ? canine; first and second premolars both one-rooted...*Cynodontomys.*[4]

The new genus Tricentes includes three species, and perhaps four. These are *T. crassicollidens* Cope, *T. bucculentus* (*Mioclænus* Cope), *T. inæquidens* Cope, and *T. subtrigonus* (*Mioclænus* Cope). These species are all represented by more or less complete crania, and are fully described in the Proceedings Amer. Philos. Society for December, 1883. They all have the orbit open behind.

The genera of Anaptomorphidæ, which on dental characters includes Indrodon, differ as follows:

*a.* Incisors three.

First superior premolar without inner lobe; posterior inner tubercle present on first and second superior true molars.....*Indrodon.*

*aa.* Incisors two.

First superior premolar with inner lobe; no posterior inner tubercle on superior molars.....*Anaptomorphus.*

The superior dental formula of Indrodon is I.,$^{3}$; C.,$^{1}$; P-m.,$^{2}$; M.,$^{3}$. The canine is compressed and acute; the third premolar is compressed conic, and has two roots; the fourth premolar has but one external cusp. The external cusps of the true molars are conic and acute, and are connected with the internal cusp by ridges which form a V. Posterior inner cusp distinct on Ms. I and II, a part of the posterior cingulum. Intermediate tubercles

[1] Filhol Rech. Phosph. Quercy.
[2] Proceedings American Philos. Society, 1883, p. 559.
[3] Leidy, Report U. S. Geol. Survey Terr., I.
[4] Cope, Pal. Bull., No. 34.

present, small. The superior incisors are well developed and display no tendency towards the rodent type. A portion of lower jaw adheres to the skull, and may belong to the same animal. It supports the last two molars. These have two anterior, opposite, approximated cusps. The heel of the penultimate molar is rather large, and has a raised edge, which develops two tubercles at the angles.

*Indrodon malaris*, sp. nov.—*Char. Specif.*—The first and third superior incisors are a little larger than the second. Canine preceded and followed by diastemata, each of which is 1.5 times as long as the long diameter of the base of the crown. Premolars separated from each other and from the first true molars by interspaces half as long as the diastemata. Neither tooth has any basal tubercles, but the posterior has a weak external cingulum, which is stronger posteriorly. The internal cusp of the same tooth is anterior, and is acute and elevated. The superior true molars have a strong external cingulum, which rises into a small tubercle opposite the space between the external principal cusps. Of the latter the anterior is a little more conic than the posterior, and both are well within the external border. On the last molar the posterior external cusp is continuous with the external intermediate tubercle, and forms a cutting edge within the posterior margin of the crown. The posterior inner tubercle is rather large, and projects further inwards than the apex of the anterior V or the second true molar, but not so far as in the species of Anisonchus and Haploconus.

The surface of the cranium is too much obscured by cracks and films of matrix to permit a view of the sutures and foramina. The face is wide, as the posterior part of the maxillary and the malar bones are expanded outwards. I have not yet been able to ascertain the condition of the orbit posteriorly. The mandibular ramus is rather slender.

| MEASUREMENTS. | M. |
|---|---|
| Length of dental series from posterior base of I III | .0248 |
| Length of bases of superior incisors | .0060 |
| Length of premolars on maxillary bone | .0060 |
| Length of base of Pm. IV | .0028 |
| Width do. | .0038 |
| Diameters M. II { anteroposterior | .0033 |
| Diameters M. II { transverse | .0040 |
| Diameters inferior M. II { anteroposterior | .0032 |
| Diameters inferior M. II { transverse | .0030 |
| Depth of ramus mandibuli at M. II | .0070 |

The skull is about the size of that of the *Bassaris astuta*. New Mexico; D. Baldwin discoverer.

The discovery of this type in the Puerco formation is a fact of interest. In the shortening of its dental series it is the most specialized genus of the epoch, while the forms of its true molars

are like those of the simple Creodonta, and more specialized than those of Anaptomorphus and the lemurs generally. In the simplicity of its premolars, however, it maintains the general character of the Puerco fauna, and is more primitive than the forms just named. Its nearest ally of the Puerco yet known is Chriacus.—*E. D. Cope.*

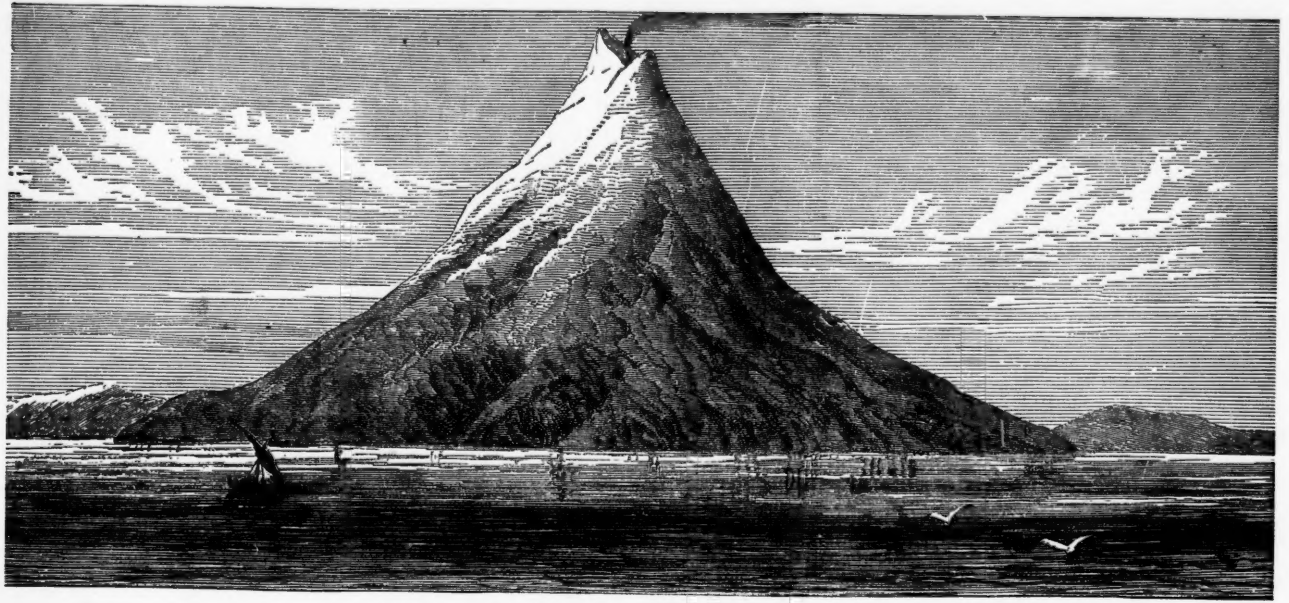
THE DESTRUCTION OF THE VOLCANO OF KRAKATOA.—It now appears that this volcano was not wholly destroyed during the great eruption on August 26th, a portion of its southern aspect still remaining. How it appeared before the catastrophe may be seen in the accompanying illustration from the *Scientific American*. *Nature* for Oct. 25 prints several communications respecting the great earthquake wave which was felt at Aden, Cape of Good Hope, and the Mauritius. Farther facts of much interest appear in *Nature* for Nov. 8. It seems that on May 22, 1883, Krakatoa was in a state of eruption, sending out showers of ashes and streams of pumice. The activity continued during June and July.

HUNTING FOR LOST GLACIERS WITH A MICROSCOPE.—Considerable work has been done in this direction in Germany and elsewhere, by various observers, work with which geologists are more or less familiar, and Dr. E. Geinitz gives the results of an extended study of the plagioclase rocks and phonolites of the Mechlenburg drift.

The method consists in examining thin sections of the rocks found in the drift, and comparing them with the descriptions given by the Scandinavian lithologists of rocks known *in situ* in that peninsula. In this way various basalts, diabases, gabbros, diorites and phonolites are referred to certain localities in Sweden, whence they are supposed to have been derived. Interesting results can be obtained by such methods, but they are often uncertain, since it cannot be predicted that rocks of the same character do not exist, or have not existed, in the intermediate drift or water-covered areas.—*Journal of R. Microscopical Society.*

GEOLOGICAL NOTES.—*General.*— Professor T. R. Jones, in a report presented to the British Association at its last meeting, gave a synopsis of the fossil Phyllopoda. He recognizes thirty genera, of which seventeen occur in Great Britain.——Mr. Hy. Woodward (*Geol. Mag.*, Oct.) commences a synopsis of the genera and species of carboniferous limestone trilobites. The first paper is almost entirely occupied with the genus Phillipsia, eight species of which are diagnosed. *P. laticaudata* is new, as is also a species referred provisionally to Proetus, under the title of *P. levis*. The second paper (Nov.) diagnoses nine species of Griffithsides, one of which is new.——The Transactions of the Royal Dublin Society contain a monograph of the fossil fishes of the Carboniferous series of Great Britain. Following the intentions

PLATE VII



The Volcano of Krakatoa, Straits of Sunda; height, 2700 feet.

of Agassiz, as far as they can be detected by his MS. labels, fifty-nine genera and 163 species are recorded, of which 117 have been obtained at Armagh, Ireland. Fourteen of the genera are founded on the spines of Hybodonts, four generic names denote various peculiar cranial bones and dermal plates, the true anatomical relations of which are as yet unknown, and forty-one are founded on the various forms of teeth of the types Orodus, Petalodus, Cochliodus, Psammodus and Copodus. Mr. Davis states that, judging from analogy, the teeth of Cladodus may have been associated with the spines of Ctenacanthus. The spines of Oracanthus are stated to have probably occupied a lateral position on the head of these elasmobranchs. The worn condition of their apices proves that they were not dorsal, while their solid points, decorated on both sides, show that they were not true dermal plates.

*Tertiary.*—Mr. Newton (*Geol. Mag.*, October) records the occurrence of the cave hyæna, which, with Professor Boyd Dawkins, he regards as a large variety of *H. crocuta*, in the "Forest Bed" strata of Suffolk, England.

*Quaternary.*—The alluvial deposits of the Kashmir district are stated by Mr. R. Lydekker to be of vast and varied extent and composition. The town of Kishtwar, in the Chinab valley, is built on one of these deposits, at a level of several hundred feet above the river. The presence of fine clayey and sandy horizontal layers in the valleys, at considerable elevations above the bottom of the valley, prove that a dam once existed lower down the valley, and Mr. Drew has estimated that the great lake of Kashmir must once have stood 2000 feet above the present level of the valley.

## MINERALOGY[1].

American Gems and Precious Stones.—Mr. Geo. F. Kunz has contributed to "The Mineral Resources of the United States," published by the Government, an article on American gems and precious stones, of which separate copies have been printed. Mr. Kunz has for some years been connected with Messrs. Tiffany and Co., the well known jewelers of New York city, and has had an excellent opportunity for collecting facts concerning American gems.

He states that systematic mining for gems and precious stones is being carried on at only two places in the United States, viz., Paris, Maine, and Stony Point, North Carolina. In other cases where gems are found they are either met with accidentally, or occur in connection with other materials that are being mined, or in small veins which are only occasionally met with. They are often gathered with little system on the surface, as is the case with

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

the sapphire, garnet and olivine found in Montana and New Mexico; or from the beds of streams and decomposing rock, as the moss agate from Colorado; or on beaches, as the agate, chlorastrolite and thomsonite from Lake Superior.

Some eighty-eight different minerals occur in the United States which have been used as gems. Twelve of these occur in the the United States only.

*Diamonds* are not mined in this country, although they have occasionally been found at a number of localities. A large diamond was found at Manchester, opposite Richmond, Va., by a laborer employed in grading one of the streets. It was an octa hedron, and weighed, after it was cut, over ten karats. It was worth $5000 before cutting. The principal localities for *sapphires* and *rubies* are in New Mexico, Arizona, and Southern Colorado, where they occur in the sand, often on ant-hills. *Garnets* occur in the same region, about $5000 worth of cut stones being annually produced. It is estimated that the value of the *tourmalines* taken from Mt. Mica, Maine, is between $50,000 and $65,000. Tourmaline and *hiddenite* are being regularly mined at Stony Point, N. C., some $7500 worth having already been sold. *Rock crystal* is gathered and cut in large quantities, the sales at different localities probably amounting to $40,000 annually. Much of it is cut for jewelry, as "Lake George" or "Cape May" "diamonds." The clear crystal for optical purposes is almost entirely Brazilian, as the good material found here rarely reaches the proper channels. Although *agates* are abundant here, nearly all the polished specimens sold in America have been polished in Germany, having originally came from Brazil and Uraguay. *Moss agates*, however, are collected here in large quantities, although the cutting is done abroad. The *sunstone* and *moonstone* from Pennsylvania and Virginia is of good quality, although as yet used but little. The American *turquoise* is of much interest, but is not much used by jewelers. It is frequently blue when found, but soon turns green on exposure. *Jet* occurs in Colorado and Texas, and will probably soon be utilized in the arts. The *Bowenite* of Rhode Island, and the *Williamsite* of Pennsylvania, are used as a substitute for jade.

A large number of minerals have been cut and used as gems or ornaments, and Mr. Kunz's article will be of service in stimulating more systematic search for the precious minerals. It could be wished, perhaps, that the article referred to was more complete as to localities, but this will doubtedless be rectified in another year's report.

In stating that sphene does not occur as a gem in the United States, Mr. Kunz has evidently not been aware of the beautiful, transparent yellow crystals, often of large size, which occur in Delaware county, Pennsylvania.

A NEW MINERAL.—Under the name of *richellite* MM. Cesaro and Despret[1] have described a supposed new mineral from Richelle, near Visé, Belgium. It is regarded as a hydrous fluo-phosphate of iron and calcium, and is a compact, soft, earthy substance of pale yellowish color and greasy luster, having a hardness of 2–3 and specific gravity 2. The composition is

| $PO_5$ | $Fe_2O_3$ | $Al_2O_3$ | $CaO$ | $H_2O$ |
|---|---|---|---|---|
| 28 67 | 28.71 | 1.80 | 5.64 | 35.54 |

Of the water, 23.33 per cent is driven off at 100°. Further examination is needed to show that the mineral is homogeneous and a good species.

GEMS FROM THE HIMALAYA MOUNTAINS.—Professor C. U. Shepard[2] has called attention to the discovery of a remarkable locality for sapphire and ruby in the Himalaya mountains. The crystals occur with other varieties of corundum in a schistose or slaty rock, and are associated with chlorite. The gems, which are limpid and finely colored, are also finely crystallized. The locality was discovered accidentally, but is now guarded by government troops. Professor Shepard believes that the resemblances between the mode of occurrence of these Indian gems and those found in North and South Carolina are "sufficiently important to encourage the expectation that valuable corundum gems may yet be found in the United States."

Professor Shepard is apparently not aware that a much more full account of this discovery of gems in India was published more than a year ago, by Professor F. R. Mallet, in a paper entitled "On Sapphires recently discovered in the northwest Himalaya."[3]

It is there stated that the correct locality is Padam, east of the village of Machel, Zanskar district, territory of Kashmir. The gems were exposed by a landslide, and occur far up on the mountain at the limit of perpetual snow. Some of the sapphires discovered were a foot in length. A physical and crystallographic description of the crystals is given. In the center of a hexagonal prism of sapphire, a cavity was found, in which were two crystals of tourmaline. Frequently the specimens are coated with a thin white mineral resembling gibbsite.

The crystals are bluish white and translucent, with transparent fine blue portions irregularly mixed. These blue portions of course constitute the only valuable parts of the crystals, and are carefully cut out by the lapidaries.

DESCLOIZITE FROM MEXICO.—S. L. Penfield[4] has analyzed a vanadium mineral from near Zacatecas, Mexico, which, while having the physical properties of the mineral recently described

[1] Ann. Soc. Belg., Mem. x, 1883.
[2] *Amer. Jour. Sc.*, Nov., 1883.
[3] Records Geolog. Surv. of India, Vol. xv, Part 2, p. 138.
[4] *Amer. Jour. Sc.*, Nov., 1883.

by A. Frenzel under the name of *tritochorite*, appears to be undoubted descloizite. The very small crystals, grouped somewhat like the common crystallizations of calamine or prehnite, had a columnar fibrous structure, distinct columnar cleavage, dark-brown color and resinous luster, with hardness 3.5, and specific gravity 6.200.

Before the blowpipe it gave reactions for vanadium, arsenic, lead, copper and zinc, and in the closed tube it fused readily, boiled up violently and gave off water.

A careful analysis gave

| $V_2O_5$ | $As_2O_5$ | $P_2O_5$ | PbO | CuO | ZnO | $H_2O$ |
|---|---|---|---|---|---|---|
| 18.95 | 3.82 | 0.18 | 54.93 | 6.74 | 12.24 | 2.70 |

It differs from descloizite in having part of the vanadic acid replaced by arsenic acid. The analyses, as well as all the physical properties of the mineral, show such a close resemblance to tritochorite that it is very possible that they are identical, and should both be considered as arsenical varieties of descloizite.

GOLD IN NORTH CAROLINA.—At a recent meeting of the Academy of Natural Sciences Professor H. Carvill Lewis exhibited some remarkable gold nuggets found in Montgomery county, N. C., forty miles east of Charlotte and two miles from Yadkin river. Some of the nuggets were of great size. One of them weighed over four pounds, and contained nearly $1000 worth of gold. It was finer than any specimen in the collection at the U. S. Mint, and was probably one of the largest nuggets ever found in Eastern America. Many of the specimens exhibited were of nearly pure gold of a crystalline structure, and of a fine golden yellow color. It was stated that in the district of North Carolina, whence these nuggets were taken, gold is very abundant. The larger nuggets were found in the gulleys, where they had been washed out of the decomposed rock, and it had been stated that a shovelful of dirt dug out of the hillsides anywhere in the district would pan out traces of gold. Some years ago one man took out of a hole sixteen feet square $30,000 worth of the precious metal. The quartzite containing the gold occurs in a white clay or decomposed schist.

## BOTANY.[1]

AN INTERESTING BOTANIC RELIC OF THE DISTRICT OF COLUMBIA.[2]—At a meeting of the Biological Society of Washington, held October 19th, Mr. Lester F. Ward exhibited the original manuscript proceedings of the Washington Botanical Society, which had accidentally fallen into his hands. This society was formed in the year 1817 and continued in existence until 1826. It

[1] Edited by PROF. C. E. BESSEY, Ames, Iowa.

[2] Communicated by Mr. Lester F. Ward.

numbered among its founders and most active members Rev. Dr. James Laurie, Dr. Alex. McWilliams and Dr. John A. Brereton, while Dr. Bigelow, of Boston, and Doctors Darlington and Barton, of Pennsylvania, were honorary members. Four years after the dissolution of this society Dr. Brereton published his "Floræ Columbianæ Prodomus," in the preface of which he briefly alludes to it. This work is still extant, and an analysis of its contents may be found in Mr. Ward's recently published "Flora of Washington."[1]

This allusion of Dr. Brereton was about all that was known of the history of the botanical society prior to the discovery of the above-mentioned document, which, containing as it does the names of all its members, its constitution and by-laws, and a careful record of all its work in the study of a then unknown and still remarkable flora, possesses great interest for local botanists. Mr. Ward promised that it should be ultimately so disposed of as to render it safe from the vicissitudes of either private individuals or ephemeral societies.

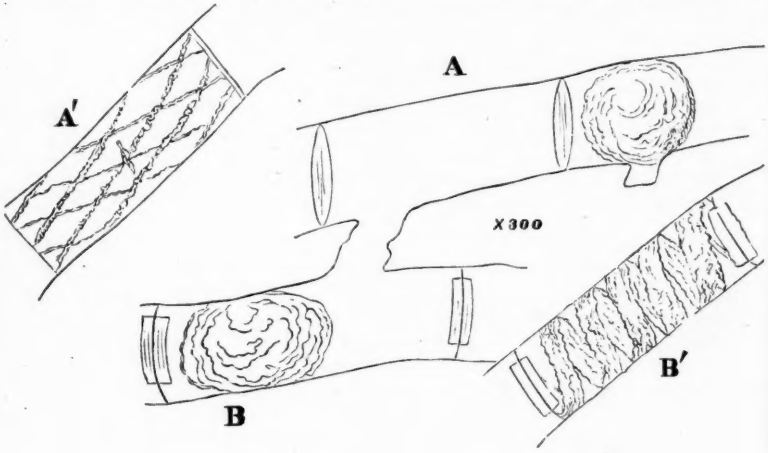
Hybridism in Spirogyra.—An interesting case of hybridism between individuals of two distinct species of Spirogyra came under my observation at Ames, Ia., in August, 1883. The plants of this genus are the familiar pond scums which occur everywhere in ponds and ditches as green stringy growths floating or attached to sticks and stones. Each plant is a long cylinder of cells, and in the latter there may be seen, under a moderate power of the microscope, the beautiful spiral arrangement of the chlorophyll bodies. Sexual reproduction takes place by the union of the protoplasm of two cells. Two plants happening to lie side by side, bud out small short branches which, growing towards each other, finally touch at their tips and then fuse into tubes. Through these tubes the protoplasm from one cell runs into and unites with that in the other. As a result of this union of protoplasm a resting spore (technically a zygospore) is formed. This process may be observed by any one almost any time during the summer, by the aid of a microscope, and there are few things which are more instructive to the beginner in vegetable physiology, who would gain some insight into the real nature of sexual reproduction.

In the case of hybridism under consideration, the two species involved were *Spirogyra majuscula* and *S. protecta*. These species differ from one another so much that there can be no question as to their distinctness. In *S. majuscula* (A and A′ in the figure) there are many very slightly coiled spirals of chlorophyll, the nucleus of the cell is very evident, and the partitions between the cells are plane; in *S. protecta* (B and B′ in the figure) on the contrary, there is but one closely coiled spiral of chlorophyll, the nu-

[1] Guide to the Flora of Washington and its Vicinity. Bulletin No. 22, U. S. National Museum. Washington, Government Printing Office, 1881.

cleus is to be seen with difficulty, if at all, and the partitions have a curious double-infolded appearance.

Two individuals, one bearing all the characters of *S. majuscula*, and the other all those of *S. protecta*, were observed in conjugation, as in the figure. The two species were almost equally abundant in the pool from which the specimen was obtained. As can be seen in the figure an apparently perfect resting spore was formed as a result of the hybridization. It is interesting to note that the form of the resting spore resembles that of *S. protecta*




A, *Spirogyra majuscula*, and B, *S. protecta* in conjugation; A′, a single cell of *S. majuscula* showing structure; B′, a single cell of *S. protecta* showing structure. (From camera sketches.)

much more than it does that of *S. majuscula*. The pure-bred resting spores of *S. protecta* in the same pool were much elongated or ellipsoidal, while those of *S. majuscula* were globular. In this instance B was functionally the female and A the male, so that here *form* followed the female.—*C. E. Bessey.*

Large Fungi.—Last summer while searching for small fungi, I found a fungus of unusual dimensions. It was on the trunk of an old tree which was decayed in places. The tree grew where the ground was wet, though not swampy; it was a tall old tree, and the fungus was so high that I could not secure it; but a gentleman found means to reach it and cut it from the tree. It proved to be *Hydnum septentrionale*, measuring about thirteen inches across, and weighing twelve pounds. The fungus was composed of layers, one above the other, alternately in light and dark brown shades of soft tints, growing darker at the base.

Where the fungus touched the tree, each layer seemed to spring directly from the wood of the tree; while each was connected with the one below it by processes resembling teeth or strings. The whole mass was compact and solid, yet there was a juiciness about the surface which made it necessary to handle it carefully lest the delicate surface become scratched. I have seen many similar specimens but rarely one so large and perfect. I noticed a statement in the NATURALIST that, as a rule, the large fungi of this species are not far from the ground. But I think that in Maine, at least, they grow high on the trees. I have many times seen them too high to reach, and I incline to the belief that a greater altitude is the rule and not the exception.

On the same tree where I found this large fungus there were several small ones lower on the trunk.—*C. W. L. Rich, Auburn, Maine.*

NEW FLORIDA FUNGI. II.—*Asterina intricata* E. & M.—Perithecia (½–¾$^{mm}$ diam.) suborbicular, flat, black, of a reticulated structure, the free ends of the reticulation forming a short, subhyaline, marginal fringe; asci abundant, obovate, sessile, 15×10$\mu$.; sporidia narrow, clavate-oblong, hyaline, with a faint gelatinous border, about 9 × 3$\mu$., endochrome once divided. Remarkable for its large flat perithecia scattered over the lower surface of the leaf without any very distinct mycelium. On living leaves of *Quercus arenaria.*

*Venturia cupulata* E. & M.—Perithecia hypophyllous, scattered, astomous, 300$\mu$. diam., hairy around the base, bald and collapsed above; hairs setaceous brown black, apices entire, 210 × 6$\mu$.; asci oblong, 48 × 12$\mu$., eight-spored; sporidia obovate, hyaline, biseriate, uniseptate, 12–13 × 4–4½$\mu$. On living leaves of *Quercus laurifolia.*

*Venturia applanata* E. & M.—Perithecia hypophyllous, lentiform (100$\mu$.), perforated in the center, of subradiate cellulose structure, with a few (12–15) erect, brown, sparingly septate hairs, 70–100$\mu$. long; asci oblong, 40 × 10–12$\mu$.; sporidia in 2–3 series, ovate-oblong, 1-septate, yellowish, 10–12 × 3$\mu$. On living leaves of *Magnolia glauca.*

*Venturia saccardioides* E. & M.—Perithecia hypophyllous, scattered, brownish-black, collapsing above (150–200$\mu$.), clothed with bristle-like hairs 100–140$\mu$. long; asci obovate, 4–6 spored; sporidia obovate, triseptate, constricted at the middle septum, hyaline, 15–16 × 3–3½$\mu$. Probably the perfectly developed asci will be found to be 8-spored. On living leaves of *Magnolia glauca.*

*Linospora ferruginea* E. & M.—Spots light yellowish-brown, border darker, narrow and slightly raised, 1½–2$^{mm}$ diam.; perithecia black, subglobose (150$\mu$.), immersed and covered above by the blackened cuticle, perforated above but ostiolum scarcely prominent; asci cylindrical, 75–80 × 7$\mu$, sessile or nearly so;

paraphyses abundant linear; sporidia 8, vermiform, yellowish, faintly nucleate, acute at each end, 35–45 × 1½μ. The perithecia are solitary, one in the center of each spot, but the spots are often sterile. On leaves of *Andromeda ferruginea.*

*Phyllosticta terminalis* E. & M.—Occupying mostly the dead, whitened tips of the leaves or occasionally the lateral margin, and bounded by a narrow purplish-black line. Perithecia globose, buried in the parenchyma of the leaf, the epidermis being slightly raised and blackened over them; spores oblong, 3–4 × about 1μ., on stout cylindrical basidia much longer than the spores themselves. On leaves of *Ilex dahoon.*

*Septoria serpentaria* E. & M.—Spots chestnut-brown, becoming darker, eroded, border obsolete, 1$^{mm}$ diam.; perithecia black, subglobose, innate-epiphyllous, 156 × 140μ.; spores subhyaline, cylindrical curved, 82–108 × 4μ. On leaves of *Quercus laurifolia.*

*Pestalozzia myricæ* E. & M.—Spots irregular, chestnut-brown (5–10$^{mm}$), acervuli innate-erumpent, epiphyllous, 75μ. diam; spores oval, dark brown, biseptate, ends hyaline, 9–12μ. long, crest 2-parted; pedicels 12 × 2μ., contracted below. On living leaves of *Myrica cerifera.*

*Helminthosporium fumosum* E. & M.—Hypophyllous in loose, olivaceous tufts which form a circular group ½–1$^{cm}$ diam, standing on a prostrate pale brick-colored, branching mycelium, which forms a radiate-fimbriate margin around the whole; the erect hyphæ are pale brown, simple, septate, 75–80 × 6μ., and bear at their tips a single obovate, brown, 3-septate spore, 25–30 × 10–12μ. On living leaves of *Persea palustris.—J. B. Ellis, Newfield, N. J., and Dr. Geo. Martin.*

Gray's Contributions to North American Botany.—From Vol. xix of the Proc. Am. Acad. of Arts and Sciences, we have received a thick pamphlet of nearly one hundred pages of Contributions to N. A. Botany, by Dr. Asa Gray. The greater part is taken up with characters of new Compositæ, with revisions of certain genera, and critical notes, while the remaining portion includes miscellaneous genera and species. It is impossible to over estimate the value these occasional contributions possess for the careful student of systematic botany. The critical notes upon species are especially instructive, and might well be studied with care by our younger botanists who are entering upon work in the field of systematic botany.

Among the interesting plants described is a white-rayed Silphium (*S. albiflorum*) from Texas, closely related to the ordinary compass plant. In the thistles (now of the genus Cnicus, formerly Cirsium) the species *C. discolor* is hereafter to be the variety *discolor* under *C. altissimus.*

"Of genuine Lactuca, or the Scariola section, we appear to

have five indigenous species, namely, *L. canadensis* L., the oldest name of the *L. elongata* Muhl., &c.; *L. integrifolia* Bigelow (a better and perhaps as old a name as *L. sagittifolia* Ell., which is not quite certain); *L. hirsuta* Muhl. and Nutt. (as old and quite as good a name as *L. sanguinea* Bigelow); *L. graminifolia*, a southern species of wide extension westward; *L. ludoviciana* DC., a species which ranges from Dakota to Texas, and is marked by its larger heads and more imbricated and large-bracted involucre."

A new species of honeysuckle (*Lonicera sullivantii*) is described. It occurs from Central Ohio to Illinois, Wisconsin and Winnipeg, and also in Tennessee, etc. It has hitherto been considered a form or variety of *L. flava*, from which it is now for the first time separated. If we understand it aright, *L. sullivantii* is the northern species, while *L. flava* is strictly a southern species. In this connection it may also be stated that hereafter the small honeysuckle (*Lonicera parviflora* of the manuals) is to be known as *L. glauca* Hill, and that the var. *douglasii* is to be erased.

A Suggestion in regard to the Publication of new Species.—Some months ago one of the foremost of our American botanists suggested the propriety of demanding in case of publication of descriptions of new species in scientific journals, that specimens should in every case accompany the descriptions. The suggestion is well worth considering in these days when nearly every discoverer is inclined to make free use of his right to describe what he has found. There can be little doubt that it is wise to permit and encourage such work on the part of our best collectors. The stimulation it gives to the whole work in the field of systematic botany is no small part of the good which results. But a serious inconvenience often arises as a consequence of such a mode of publication. It is, in the first place, difficult to find the descriptions on account of the well-known inaccuracy of most of the journal indexes, and in the second place it too often happens that the specimens upon which the descriptions were based, soon become inaccessible. These difficulties might be more or less completely remedied by our scientific journals adopting any of the following plans:

1. Every description to be accompanied by the statement that type specimens were deposited in this or that established herbarium.

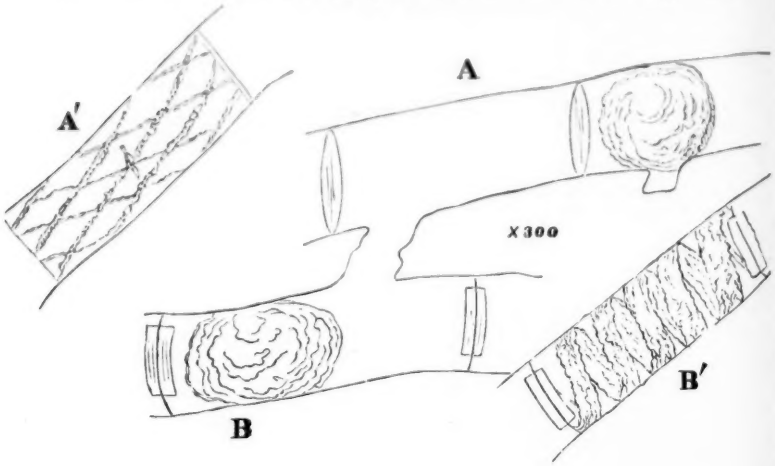
2. Every description to be accompanied by specimens to be distributed by the editor of the journal giving such publication.

3. No description to be given until specimens are deposited in the National Herbarium.

The last is essentially the recommendation made in the November number of the London *Journal of Botany*. It would simplify matters very much if in every case the deposited speci-

cleus is to be seen with difficulty, if at all, and the partitions have a curious double-infolded appearance.

Two individuals, one bearing all the characters of *S. majuscula*, and the other all those of *S. protecta*, were observed in conjugation, as in the figure. The two species were almost equally abundant in the pool from which the specimen was obtained. As can be seen in the figure an apparently perfect resting spore was formed as a result of the hybridization. It is interesting to note that the form of the resting spore resembles that of *S. protecta*




A, *Spirogyra majuscula*, and B, *S. protecta* in conjugation; A′, a single cell of *S. majuscula* showing structure; B′, a single cell of *S. protecta* showing structure. (From camera sketches.)

much more than it does that of *S. majuscula*. The pure-bred resting spores of *S. protecta* in the same pool were much elongated or ellipsoidal, while those of *S. majuscula* were globular. In this instance B was functionally the female and A the male, so that here *form* followed the female.—*C. E. Bessey.*

Large Fungi.—Last summer while searching for small fungi, I found a fungus of unusual dimensions. It was on the trunk of an old tree which was decayed in places. The tree grew where the ground was wet, though not swampy; it was a tall old tree, and the fungus was so high that I could not secure it; but a gentleman found means to reach it and cut it from the tree. It proved to be *Hydnum septentrionale*, measuring about thirteen inches across, and weighing twelve pounds. The fungus was composed of layers, one above the other, alternately in light and dark brown shades of soft tints, growing darker at the base.

Where the fungus touched the tree, each layer seemed to spring directly from the wood of the tree; while each was connected with the one below it by processes resembling teeth or strings. The whole mass was compact and solid, yet there was a juiciness about the surface which made it necessary to handle it carefully lest the delicate surface become scratched. I have seen many similar specimens but rarely one so large and perfect. I noticed a statement in the NATURALIST that, as a rule, the large fungi of this species are not far from the ground. But I think that in Maine, at least, they grow high on the trees. I have many times seen them too high to reach, and I incline to the belief that a greater altitude is the rule and not the exception.

On the same tree where I found this large fungus there were several small ones lower on the trunk.—*C. W. L. Rich, Auburn, Maine.*

NEW FLORIDA FUNGI. II.—*Asterina intricata* E. & M.—Perithecia ($\frac{1}{2}$–$\frac{3}{4}$$^{mm}$ diam.) suborbicular, flat, black, of a reticulated structure, the free ends of the reticulation forming a short, subhyaline, marginal fringe; asci abundant, obovate, sessile, 15×10$\mu$.; sporidia narrow, clavate-oblong, hyaline, with a faint gelatinous border, about 9 × 3$\mu$., endochrome once divided. Remarkable for its large flat perithecia scattered over the lower surface of the leaf without any very distinct mycelium. On living leaves of *Quercus arenaria.*

*Venturia cupulata* E. & M.—Perithecia hypophyllous, scattered, astomous, 300$\mu$. diam., hairy around the base, bald and collapsed above; hairs setaceous brown black, apices entire, 210 × 6$\mu$.; asci oblong, 48 × 12$\mu$., eight-spored; sporidia obovate, hyaline, biseriate, uniseptate, 12–13 × 4–4$\frac{1}{2}\mu$. On living leaves of *Quercus laurifolia.*

*Venturia applanata* E. & M.—Perithecia hypophyllous, lentiform (100$\mu$.), perforated in the center, of subradiate cellulose structure, with a few (12–15) erect, brown, sparingly septate hairs, 70–100$\mu$. long; asci oblong, 40 × 10–12$\mu$.; sporidia in 2–3 series, ovate-oblong, 1-septate, yellowish, 10–12 × 3$\mu$. On living leaves of *Magnolia glauca.*

*Venturia saccardioides* E. & M.—Perithecia hypophyllous, scattered, brownish-black, collapsing above (150–200$\mu$.), clothed with bristle-like hairs 100–140$\mu$. long; asci obovate, 4–6 spored; sporidia obovate, triseptate, constricted at the middle septum, hyaline, 15–16 × 3–3$\frac{1}{2}\mu$. Probably the perfectly developed asci will be found to be 8-spored. On living leaves of *Magnolia glauca.*

*Linospora ferruginea* E. & M.—Spots light yellowish-brown, border darker, narrow and slightly raised, 1$\frac{1}{2}$–2$^{mm}$ diam.; perithecia black, subglobose (150$\mu$.), immersed and covered above by the blackened cuticle, perforated above but ostiolum scarcely prominent; asci cylindrical, 75–80 × 7$\mu$, sessile or nearly so;

paraphyses abundant linear; sporidia 8, vermiform, yellowish, faintly nucleate, acute at each end, 35–45 × 1½μ. The perithecia are solitary, one in the center of each spot, but the spots are often sterile. On leaves of *Andromeda ferruginea.*

*Phyllosticta terminalis* E. & M.—Occupying mostly the dead, whitened tips of the leaves or occasionally the lateral margin, and bounded by a narrow purplish-black line. Perithecia globose, buried in the parenchyma of the leaf, the epidermis being slightly raised and blackened over them; spores oblong, 3–4 × about 1μ., on stout cylindrical basidia much longer than the spores themselves. On leaves of *Ilex dahoon.*

*Septoria serpentaria* E. & M.—Spots chestnut-brown, becoming darker, eroded, border obsolete, 1$^{mm}$ diam.; perithecia black, subglobose, innate-epiphyllous, 156 × 140μ.; spores subhyaline, cylindrical curved, 82–108 × 4μ. On leaves of *Quercus laurifolia.*

*Pestalozzia myricæ* E. & M.—Spots irregular, chestnut-brown (5–10$^{mm}$), acervuli innate-erumpent, epiphyllous, 75μ. diam; spores oval, dark brown, biseptate, ends hyaline, 9–12μ. long, crest 2-parted; pedicels 12 × 2μ., contracted below. On living leaves of *Myrica cerifera.*

*Helminthosporium fumosum* E. & M.—Hypophyllous in loose, olivaceous tufts which form a circular group ½–1$^{cm}$ diam, standing on a prostrate pale brick-colored, branching mycelium, which forms a radiate-fimbriate margin around the whole; the erect hyphæ are pale brown, simple, septate, 75–80 × 6μ., and bear at their tips a single obovate, brown, 3-septate spore, 25–30 × 10–12μ. On living leaves of *Persea palustris.—J. B. Ellis, Newfield, N. J., and Dr. Geo. Martin.*

Gray's Contributions to North American Botany.—From Vol. xix of the Proc. Am. Acad. of Arts and Sciences, we have received a thick pamphlet of nearly one hundred pages of Contributions to N. A. Botany, by Dr. Asa Gray. The greater part is taken up with characters of new Compositæ, with revisions of certain genera, and critical notes, while the remaining portion includes miscellaneous genera and species. It is impossible to over estimate the value these occasional contributions possess for the careful student of systematic botany. The critical notes upon species are especially instructive, and might well be studied with care by our younger botanists who are entering upon work in the field of systematic botany.

Among the interesting plants described is a white-rayed Silphium (*S. albiflorum*) from Texas, closely related to the ordinary compass plant. In the thistles (now of the genus Cnicus, formerly Cirsium) the species *C. discolor* is hereafter to be the variety *discolor* under *C. altissimus.*

"Of genuine Lactuca, or the Scariola section, we appear to

have five indigenous species, namely, *L. canadensis* L., the oldest name of the *L. elongata* Muhl., &c.; *L. integrifolia* Bigelow (a better and perhaps as old a name as *L. sagittifolia* Ell., which is not quite certain); *L. hirsuta* Muhl. and Nutt. (as old and quite as good a name as *L. sanguinea* Bigelow); *L. graminifolia*, a southern species of wide extension westward; *L. ludoviciana* DC., a species which ranges from Dakota to Texas, and is marked by its larger heads and more imbricated and large-bracted involucre."

A new species of honeysuckle (*Lonicera sullivantii*) is described. It occurs from Central Ohio to Illinois, Wisconsin and Winnipeg, and also in Tennessee, etc. It has hitherto been considered a form or variety of *L. flava*, from which it is now for the first time separated. If we understand it aright, *L. sullivantii* is the northern species, while *L. flava* is strictly a southern species. In this connection it may also be stated that hereafter the small honeysuckle (*Lonicera parviflora* of the manuals) is to be known as *L. glauca* Hill, and that the var. *douglasii* is to be erased.

A Suggestion in regard to the Publication of new Species.—Some months ago one of the foremost of our American botanists suggested the propriety of demanding in case of publication of descriptions of new species in scientific journals, that specimens should in every case accompany the descriptions. The suggestion is well worth considering in these days when nearly every discoverer is inclined to make free use of his right to describe what he has found. There can be little doubt that it is wise to permit and encourage such work on the part of our best collectors. The stimulation it gives to the whole work in the field of systematic botany is no small part of the good which results. But a serious inconvenience often arises as a consequence of such a mode of publication. It is, in the first place, difficult to find the descriptions on account of the well-known inaccuracy of most of the journal indexes, and in the second place it too often happens that the specimens upon which the descriptions were based, soon become inaccessible. These difficulties might be more or less completely remedied by our scientific journals adopting any of the following plans:

1. Every description to be accompanied by the statement that type specimens were deposited in this or that established herbarium.

2. Every description to be accompanied by specimens to be distributed by the editor of the journal giving such publication.

3. No description to be given until specimens are deposited in the National Herbarium.

The last is essentially the recommendation made in the November number of the London *Journal of Botany*. It would simplify matters very much if in every case the deposited speci-

mens were soon accompanied by the printed descriptions. We shall return to this matter again ere long, and in the meantime shall be glad to receive further suggestions.—*C. E. Bessey.*

REMARKABLE FUNGUS GROWTH.—I have lately received from Messrs. B. M. Everhart and W. T. Haines, of West Chester, Pa., a very curious growth, an account of which may be of interest. This strange production is no doubt an abortive growth of the mycelium of some fungus unable to assume its normal form and character for want of light and air.

In the letter of Messrs. Everhart and Haines, accompanying the specimen, they say: "About two years ago a gentleman of this place, Dr. Warren, preparing to build a stable on his place, visited Philadelphia and purchased some of the material taken from the buildings then being torn down to make room for the new depot of the Penna. R. R., at Fifteenth and Filbert streets. This material consisted of pine flooring and hemlock joists, and was used by Dr. Warren for laying a floor in the stable he was building. Under this floor was a cellar about four feet deep without window or opening of any sort, and consequently entirely dark. Some time afterwards, for the purpose of ventilation, a hole or trap door was cut through this floor, when it was discovered that the under side of the floor was coated and festooned with the curious fungoid growth before mentioned. Here and there were hollow, bladder-like bodies six inches in diameter and perhaps twice as long, suspended by a stringy mycelium, while in other places a sponge-like mass of mycelium a foot in diameter would be suspended like the bladder-shaped bodies by a cord or string of mycelium as thick as one's finger, the lower part of the suspended mass reaching nearly or quite to the bottom of the cellar and hanging in loose shreds like pieces of white cloth that had been through a threshing machine. The texture of the whole was very light and delicate, so that the cotton-like fibers of the outside of the suspended bodies would move with the least breath of air. The whole was very moist, with drops of water standing on it, and seemed to be enveloped in a mist. Portions of this curious growth taken out and hung in a dry room near a hot stove had, in two days, shriveled to less than half their original size, and were of a yellowish-white color, had a rather agreeable sweetish smell and adhered slightly to the fingers. On shaking the dried mass fragments like snow flakes separated and fell to the floor."

The specimens sent me some days ago have not changed in appearance since I received them. One of them consists of a spongy, white, torn and ragged bundle like a much-worn dish cloth or bundle of white rags, more compact above, where it is gradually contracted into the suspending cord, which is about as thick as one's finger, tapering above to the size of a pipe stem and

of about the same consistency and appearance as a piece of deer skin.

My friends, Messrs. Everhart and Haines, incline to the opinion that this is the *Byssus septicus* of Withering, and quote descriptions of that production which is said to "grow most luxuriantly in bins or on wooden shelves in cellars where wine has been spilt, hanging down in the form of a jelly bag or of a cylinder with a globe at the end, to the length of a foot or more. It is easily crushed, and then seems principally to consist of water adhering to the fingers." It is quite probable that this may be the genuine *Byssus septicus*, but it is evidently only the mycelium of some fungus, being entirely without fruit of any kind, and of the same nature as the curious fungoid growths in old abandoned mines and subterranean galleries. To what species this mycelium pertains it is of course impossible to say, though it is not improbably the mycelium of *Polyporus destructor* Fr., which in confined and damp places is known to luxuriate in various abnormal growths.—*J. B. Ellis, Newfield, N. J.*

ERRATUM.—By an annoying typographical error on page 1280 of the December NATURALIST, ninth line from the bottom, the word *Entomophthora* was misspelled.

BOTANICAL NOTES.—Dr. Farlow, in the November *Botanical Gazette*, concludes his interesting and valuable "Enumeration of the Peronosporeæ of the United States." It is in reality much more than an enumeration, for every species (thirty-six in all) is described, and for each the synonymy is given, as well as reference to the exsiccati and literature. The species are distributed as follows: Phytophthora, 1; Peronospora, 31; Cystopus, 4.——The publishers of the *Botanical Gazette* offer a prize of fifty dollars for *the best life-history of any plant*, the result of original investigations. The papers are to be finished on or before the 1st of Nov., 1884. Further particulars may be learned by addressing the editor of the *Gazette*, Crawfordsville, Indiana.——A similar prize of from sixty to one hundred dollars for the best paper, and of fifty dollars for the second best, is also offered by the Boston Society of Natural History, as announced in the advertising pages of the NATURALIST. Surely biological botany should no longer lag.——Dr. Vasey's "Grasses of the United States," recently issued as a special report from the Department of Agriculture, Washington, D. C., is one of the most valuable papers which that department has issued. Synopses and descriptions of the tribes and genera of our native grasses are given, and under each genus all our indigenous species are catalogued. The arrangement is in accordance with that of Bentham and Hooker in their Genera Plantarum. The whole number of genera is 114, while of species there are enumerated 589.——The Catalogue of Canadian Plants, Part 1, Polypetalæ, by Professor John Macoun, which has lately appeared as

one of the publications of the Geological and Natural History Survey of Canada, is a publication of much promise. It is doubtless the forerunner of a flora of Canada, which has long been needed. It includes 907 species, although extending no further than the end of the Polypetalæ.——The Catalogue of the Plants of Worcester county, Mass., by Professor Joseph Jackson, published by the Worcester Natural History Society, is creditable both to the author and the society which furnished the means for its publication. It contains 812 species and well-marked varieties, distributed among 387 genera. Why do not more local societies undertake the publication of such lists?——From the Bulletins of the U. S. Fish Commission we have a list of marsh and aquatic plants of the U. S., many of which are suitable for carp ponds, by L. F. Ward. It includes flowering plants only.

## ENTOMOLOGY.[1]

THE GENUS COLIAS.—As "Contributions from the Northern Transcontinental Survey," Dr. H. A. Hagen has sent us from the Proceedings of the Boston Society of Natural History, Vol. XXII, pp. 150–178, an interesting paper containing the results of his studies on the genus Colias. We have read it over with a good deal of interest and care, and while it upsets much of the descriptive work which Mr. W. H. Edwards has done, we feel that Dr. Hagen is in almost every case justified by the facts and by the recognized variability in the genus and in Lepidoptera generally. Dr. Hagen's method has been, first, to familiarize himself with the publications on the subject both here and abroad, and then to critically study large sets of specimens wherever such were available. He reduces the number of species (exclusive of *eurydice* and *cæsonia*) to nine, as follows:

1. *Colias chrysotheme* = *keewaydin*, with seasonal forms *ariadne* and *eurytheme*.
2. *C. philodice*, with seasonal form mimicking *ariadne*, and with north-western forms *eriphyle* and *chrysomelas*.

   ("Nos. 1 and 2 are so nearly related to each other that obviously reliable differences are still a want," p. 152.)
3. *C. interior*, synonyms *edwardsii* with *emelia* and *astræa*, *alexandra*, *scudderi*, *occidentalis*, *christina*, var. *harfordii* with female *barbara*, var. *laurentina*. (*C. pelidne* Boisd., is united with *C. palæno*, unless the type should prove its identity with *C. interior*.)
4. *C. palæno* with var. *pelidne* Boisd., Staud, and *chippewa*.
5. *C. meadii*.
6. *C. behrii*.
7. *C. nastes*.
8. *C. hecla*.
9. *C. boothii*.

Nos. 5 to 9 are simply enumerated, as little or no material was

[1] This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.

at hand, and it is safe to assume that species founded as they have been, on limited material, will not stand, but will all come to be looked upon as extreme forms of *chrysotheme*. However this may be, but four species that are at all well known, exclusive of *eurydice* and *cæsonia*, are recognized by Dr. Hagen.

A critical study of his paper renders it doubtful whether the context warrants even these four. *C. harfordii* and *barbara* are made (on p. 165) synonymous with what Wm. H. Edwards figured as the male of *keewaydin*, so that *interior*, of which they are also made synonyms, should perhaps be joined to *chrysotheme*. *Philodice* and *anthyale* are made synonymous, while Mr. W. H. Edwards also acknowledges in his later writings the identity of *palæno* and *anthyale* with *philodice*, and of *ariadne* and *keewaydin* with *eurytheme*. Thus the logic of Dr. Hagen's showing is, that of the common and wide-spread forms we have but two species viz., *chrysotheme* and *philodice*. The fact that Moeschler and Keferstein unite *interior* with *philodice* also confirms the invalidity of *interior* and of all the varieties that Hagen associates with it.

Now we have long held the opinion that *eurytheme* and *philodice*, as they occur in the Mississippi valley, could not satisfactorily be separated by any permanent specific characters, and our breeding experience tends to confirm this view (though the notes have never been published). Hence as Hagen argues that *eurytheme* and *chrysotheme* are one, by parity of reasoning the conclusion is inevitable that our commoner North American forms of Colias are all reducible to three, viz., *eurydice*, *cæsonia* and *chrysotheme* with its thirty or more races and varieties. This would seem to mean that the more fully abundant material from all sections is studied, the more hopelessly confused our specific divisions become, and this is just what it does mean, as we insisted in our recent remarks (p. 975) on the discussion of a similar question between Messrs. Hagen and Edwards. Some years ago in private correspondence with the latter, we insisted that half the so-called species, including some of his own, ought to be rejected, and that we recognized but two good species at St. Louis, viz., *cæsonia* and *eurytheme*, not being satisfied at that time that this last was identical with *chrysotheme*. Some of the species have been made on ridiculously trivial grounds, while others deserve the designation according to the ordinary conceptions of specific value among lepidopterists. A study of the genitalia may serve to separate two or three of the well-founded species and the rest should fall in as ordinary varieties, geographical varieties and races, and seasonal forms, the names proposed as specific being retained for convenience, very much as Mr. Edwards has so admirably done with the forms of *Pieris napi*.

The genus may be looked upon as a plastic one in which the species are in process of forming, but in most cases have not be-

come well differentiated. The pamphlet quotes in a postscript the characters which Mr. Keferstein has found variable and therefore not of specific value in the genus. These include the discal spots on upper side of primaries and under side of secondaries, the submarginal series of spots on under side of primaries and the "mealy spot." If we add coloration within limits, and form of wing, as we are justified in doing, we must evidently depend on the more constant though less noticeable structure of the body. —*C. V. R.*

Habits of Blaps and Embaphion.—Among the more recent introductions from the Old World are two species of the Tenebrionid genus Blaps.[1] Both species occur in Europe abundantly in stables, warehouses, dirty cellars, etc., and are so rarely met with away from such buildings that they may properly be included among the numerous "domestic" insects to which the family Tenebrionidæ furnishes a not inconsiderable contingent. The North American representatives of Blaps are the numerous species of Eleodes which form the most conspicuous feature of the Coleopterous fauna of the Central and Pacific regions of our continent. Some of the species occur in an incredible number of individuals but I am not aware that any species has thus far any tendency to acquire habits similar to those of the two Blaps mentioned above. Mr. Lawrence Bruner informs me, however, that another large Tenebrionid, *Embaphion muricatum* Say, is at present met with in large numbers in cellars in Nebraska, and that it is much more frequent in such places than outdoors. It would thus appear that this Embaphion flourishes more in the vicinity of human habitations than in its native haunts, and this fact is the more interesting that the species belongs to the small number of native American species which are habitually met with in our houses, the large majority of such domestic Coleoptera being either European forms or at least cosmopolitan species of uncertain origin.—*E. A. Schwarz, Washington, D. C.*

Larval Habits of the Dipterous family Dexidæ. — Dr. Fr. Brauer has recently made some interesting observations on the entomography of *Hirmoneura obscura* (Sitzungsber. d. Kais. Akad. d. Wiss. LXXXVIII, pp. 865–75) which have incidentally led to the discovery of two other Dipterous parasites of the Rhizotrogus larva and belonging to the family Dexidæ, of which little has thus far been known. A small parasitic larva produced *Dexia rustica* Fall., while another larger one was found within the abdomen of the Rhizotrogus larva adjacent to the colon of the intestinal canal. It was encased in a membraneous sac closely resembling the colon and which, tapering posteriorly, ended in a some-

[1]The specimens I saw and which were said to be found in Virginia were all *Blaps fatidica*. Of the second species, *B. mortisaga*, I have not yet seen undoubted American specimens.

what bent, chitinous funnel, open at the end. This opening probably connects with one of the tracheæ of the beetle larva. The Dipterous larva lies in this sac with its abdomen reaching within the funnel. Puparia of the parasite were found in the ground and produced in July the perfect fly, which proved to be *Phorostoma latum* Egger. Dr. Brauer describes and illustrates the anatomical details of this larva.

Of our North American Dexidæ the habits of only one species have been recorded thus far, viz., the parasite on *Diabrotica vittata*, described by Dr. Henry Shimer (AM. NAT., V, p. 219) as *Melanosphora diabroticæ*, a species which is doubtfully referred in Osten-Sacken's catalogue to the genus Melanophora Meigen, as the figure and description do not permit of positive determination.

NORTHERN LOCALITIES FOR SOUTHERN BUTTERFLIES.—In the November number of the NATURALIST, Mr. Smith, of Natick, Mass., reports Mr. Scudder as saying that the most northern locality in which *Junonia cœnia* has been found is the southern extremity of Maine, near Portsmouth, N. H. One example of this species was captured last summer by a gentleman from Bangor, in woods about four miles south of Orono. It was as large and nice as the average of a large lot captured in Florida. *Chionobas jutta* has also been taken for several years in a bog in the same vicinity. I think this is the first time it has been reported within the limits of the United States.—*Mrs. C. H. Fernald, Orono, Me.*

INSECT-LIFE AMONG SPIDER EGGS.—At the annual meeting of the San Diego, Cal., Natural History Society, a letter from Miss Rosa Smith was read referring to the discovery of the mature male of *Zilla rosa*, a beautifully colored California spider, and the insect life observed in the egg cocoons of *Epeira atrata*, the species having been determined by Dr. H. McCook, of Philadelphia. They are (1) a small ant, probably referable to Solenopsis and doubtless feeding on the spider eggs; (2) larvæ of a Dermestid beetle (*Attagenus pellio?*), apparently feeding on the refuse matter in the nest; (3) a true parasite of the Epeira eggs belonging to Pezomachus, having a secondary parasite in an undetermined Chalcid fly, which in its turn proved to be infested by a still smaller species of the same family.

ALETIA XYLINA IN THE NORTH.—Yesterday in my little garden I took a wonderfully fresh example of *Aletia argillacea*, and two years ago, when in Toronto, I found the insect extremely common on fences, &c., in the streets of the city. I found one specimen on the wall of a garden, with its wings still damp and undeveloped, having just emerged from the chrysalis. I looked all round the garden but found no Malvaceous plants except a large bush of Abutilon and the little wild mallow, *Malva rotundifolia*. —*Hy. Edwards, New York, Oct. 23, 1883.*

AQUATIC SPIDERS.—Waiting beside a mill-pond on a mild, balmy day last March, a slight wind prevailing but not enough to ruffle the surface of the water, I noticed a spider let himself down into the water from one of the trees bordering upon the pond, and as soon as it reached the water the web or strand was severed with such a length attached to his person as to act as a sail and serve to assist his propulsion, with the favoring breeze, to the other side.

Numerous spiders followed the same procedure with webs of varying lengths from three to eight feet. I supposed this was their method of crossing from side to side in search of more abundant food.

I may perhaps be only repeating what was before well-known, but as it was new to me I give it for what it is worth.—*George C. Henning, Washington, D. C., Nov. 17th, 1883.*

THE PHYLLOXERA IN SANDY SOIL.—The London *Times*, in a recent issue, contains a dispatch which gives the condition of the French grape crop, as follows:

"Only twelve of the southern departments seem satisfied with their vintage. The yield in general is expected to be even below the average of late years. Burgundy and Champagne report a yield extremely deficient, both in quantity and quality; while Macon counts upon a better crop than had been predicted, though of somewhat poor quality. In Charente the quality is also poor."

The same dispatch, in summing up the observations of Lalande, mayor of Bordeaux, on the conditions of the vines in the Phylloxera-infested sections of the country, gives a most favorable account of the use of American stocks, and shows that even the French vines at Aigues-Mortes are flourishing in the sandy soils, thus emphasizing the fact of the impotence of the Phylloxera in such sandy soils.

OSAGE ORANGE VS. MULBERRY FOR THE SILKWORM.—There is a strong disposition on the part of those who look for making money by the propagation and sale of mulberry trees, to underrate the use of osage orange as silkworm food. We have thoroughly demonstrated, by the most careful tests, on several occasions, that when *Maclura aurantiaca* is properly used for this purpose, the resulting silk loses nothing in quantity or quality, and we have now a strain of *Sericaria mori* that has been fed upon the plant for twelve consecutive years without deterioration. There has been, perhaps, a slight loss of color which, if anything, must be looked upon as an advantage. It is more than likely, however, that the different races will differ in their adaptability to the Maclura, and that for the first year the sudden transition to Maclura from Morus, upon which the worms have been fed for centuries, may result in some depreciation. Mr. Virion des Lau-

riers, at the silk farm at Genito, has completed some experiments on the relative value of the two plants, which he details in the opening number of the *Silk-Grower's Guide and Manufacturer's Gazette.* Four varieties of worms were reared. The race known as the "Var" was fed throughout on mulberry leaves. The "Pyrenean" and "Cevennes" worms were fed throughout on leaves and branches of osage orange, while the "Milanese" worms were fed on Maclura up to the second molt and then changed to mulberry leaves. At the close examples of each variety of cocoons were sent to the secretary of the Silk Board at Lyons, and appraised by him. The Maclura-fed cocoons were rated at 85 c. per pound, those raised partly on osage and partly on mulberry at 95 c. per pound, and those fed entirely on mulberry at $1.11 per pound.

This, Mr. des Lauriers thinks, seems to show that the difference between Maclura and Morus as silkworm food is some "twenty-five to thirty per cent in favor of the latter, while it is evident that the leaf of the osage orange can be used with some advantage during the *first two* ages of the worms, thus allowing the mulberry tree to grow more leafy for feeding during the last three ages." The experiment, although interesting, is not conclusive, from the simple fact that different races were used in the different tests and not the same races, so that the result may have been due, to a certain extent, to race and not to food.

THE CHINCH-BUG IN NEW YORK STATE.—Professor J. A. Lintner, State entomologist of New York, has been interviewed at length in the Albany *Argus* of Oct. 10th on the subject of Chinch-bug injuries in Northern New York. It appears that its destructive work was first discovered in June, 1882, by Mr. H. C. King, of Hammond, St. Lawrence county, and that the destruction has increased the present year though confined to grasses.

In this interview, in a communication to *Science* of Oct. 19th, and in a circular issued from the office of the State entomologist, Oct. 18th, Mr. Lintner draws attention to the rarity of the chinch-bug in the State of New York heretofore; to its persistent injury in St. Lawrence county notwithstanding the past wet season, and finds in these facts reason for the greatest alarm on the supposition that this manifestation is due to an invasion, and that the insect shows exceptional power of withstanding constant rains, which are well known to prove disastrous to it in the Mississippi valley.

We have not been able to read over these accounts without feeling that an undue amount of alarm is felt. Since the chinch-bug was known to occur in New York at the time of Harris and Fitch, and is found further north both on the Atlantic seaboard and in the Northwest, we see no reason for considering that St.

Lawrence county has been invaded from other parts, but should rather attribute the recent injury to undue increase of a species always there, albeit not generally noticed and heretofore unrecorded. This increase may in fact be due to the excessively dry weather that characterized 1880 and 1881 and previous years, the reacting wet weather not having yet produced an injurious effect upon it. In this view of the matter, which seems to be most reasonable, the outlook is rather encouraging than alarming, and we fully expect to see this view corroborated by subsequent events, *i. e.*, the pest will sink back to its state of harmlessness next year and probably perish in immense numbers during the coming winter. We would not, however, by any means have the farmers relent from the measures recommended by Mr. Lintner in the circular already alluded to, though he can scarcely expect them to carry out his advice without some obligatory law or some compensation from the State.—*C. V. R., in Scientific American.*

Bacterial Disease of the imported Cabbage-worm.—Professor S. A. Forbes, State entomologist of Illinois, has found the larvæ of *Pieris rapæ* seriously affected, around Normal, Ills., by a disease which in a few hours causes them to decay and reduces them to a black almost fluid condition, dissolving at the touch. He finds the disease due to immense numbers of Bacteria, excessively minute, and that they can be cultivated artificially in beef broth and thus introduced and propagated among healthy insects.

This black rot of the cabbage worm has been known to us for some years and is quite widespread. We have made reference to it on page 70 of our Bulletin on the Cotton-worm in connection with some experiments with yeast ferment, in the following words: "An incident connected with these experiments which I made is, however, well worthy of being mentioned, because it shows how very easily single experiments may lead to false hopes and conclusions. A certain proportion of the last named larvæ [*P. rapæ*]—the proportion differing in the lots treated—perished before, or while transforming to the chrysalis state. They became flaccid and discolored, and after death were little more than a bag of black putrescent liquid. I should have at once concluded that the yeast remedy was a success had I not experienced the very same kind of mortality in previous rearing of this larva, and had I not upon returning to the field from which the larvæ in question were obtained, found a large proportion similarly dying there."—*C. V. R., in Scientific American.*

Entomological Notes.—In a notice of the papers by Mr. E. Meyrick on the Micro-lepidoptera of Australia, New Zealand and Tasmania, Professor C. H. Fernald states that *Carpocapsa pomonella* has been introduced to those regions along with the apple.

——Lord Walsingham writes us: "Noticing your mention of *Helia americalis* as a myrmicophilous Lepidopteron (AM. NAT., Oct., 1883, p. 1070), I would remind you of *Myrmicocela ochraceella* Tgstr., which is found also in ants' nests. It is allied to the true Tineæ.

## ZOÖLOGY.

OWEN ON THE ASPECTS OF THE BODY IN VERTEBRATES AND INVERTEBRATES.[1]—The pineal and pituitary bodies, with the infundibulum, constituting what our author styles the conario-hypophysial tract, have been the theme of much discussion among naturalists. Some have seen in the pituitary, a gland secreting the intraventricular fluids of the brain, while others have believed it to be a remnant of an obsolete sense-organ.

To Professor Owen it is neither of these, but is the residuum of the deutostome, or invertebrate mouth, opening on the neural aspect of the animal and superseded in the vertebrates by a "tritostome" or hæmal mouth. In proof of this view he shows that in the lower mammals the pineal and pituitary bodies and their connections are larger and have a less parenchymatous and more tubular structure than in man; that in reptiles the pineal production perforates, as a rule, the parietal bone, but in some cases the suture between parietal and frontal; and that in fishes the relative magnitude and tubular character of this transcerebral tract are still more marked. In the skate the extension of the pineal part reaches beyond the cartilaginous roof of the brain-case, and in all Elasmobranchs it is an elongate tube, dilated at its peripheral end and maintaining its communication with the third ventricle, from the floor of which the infundibulum extends to join the pituitary body. In the brain of the Chimæra the cerebral masses are separated from the optic lobes by cord-like lamellæ equal in length to the structures they separate. These cord-like lamellæ seem to represent the crura cerebri, and the space between them, which is traversed by the pineal body and its connections, is the third ventricle. This structure seems to indicate that the crura cerebri are homologous with the parial cords which girt the gullet and connect the fore brain with the hinder masses in invertebrates. In the embryos of all vertebrates the pineal extension seems in quest of an open or oral outlet, but is checked by the external skin in lower forms, and by the cranial roof of the brain in the higher ones.

If it be admitted, with the great authority who, following in the line of Geoffrey St. Hilaire, advocates the "Unity of Organization" of the vertebrate and invertebrate kingdoms, that just as the umbilicus is the remnant of the protostome or primordial mouth, so the pineal body and its connections are the remnant in

[1] Aspects of the Body in Vertebrates and Invertebrates. By Richard Owen. London, 1883.

the vertebrate of the neurally situated mouth of the arthropod or mollusk, then the objections urged by Cuvier against the views of his great rival are answered, and the dorsal (hæmal) aspect of a caterpillar or crustacean must be considered to correspond with the ventral (hæmal) aspect of a vertebrate. Hæmal and neural must then be used in preference to dorsal and ventral, since the latter depend only upon the position of the mouth, neural in the Invertebrata, and separating the brain-ganglia to become so; and hæmal in the Vertebrata by the abortion of the portion directed neurad, and the connection of the alimentary canal with the invagination of the ectoblast.

The arguments in favor of the homology of the dorsal aspect of an insect with the ventral aspect of a vertebrate are certainly far stronger than anything which can be urged against them, yet there seems to be at least one important point in which the conario-hypophysial tract fails to correspond with the invertebrate gullet. The whole of the tract in question is situated anteriorly to the optic vesicle in the embryo and to the optic lobes in the adult. The homologue of optic lobes and nerves should, therefore, if this tract represents the invertebrate gullet, be found in the sub or neur-œsophageal ganglion of the invertebrate.

That this is not the case is clearly shown both by the diagrams and descriptions of Professor Owen. The supra-œsophageal or hæm-œsophageal mass, in both cephalopod and insect, contains the optic nerves and the brain-enlargement at their base. If, as our author asserts, in agreement with other anatomists, the eyes of the cuttlefish are the homologues of those of the lumpfish, must we not seek for traces of the invertebrate deutostome between the optic lobes and the hind brain, rather than between them and the cerebrum?—*W. N. L.*

Forbes' Studies of the Food of Animals.[1]—Some of the results arrived at by this investigation have already been reviewed in the Naturalist. The first essay deals with the regulative action of birds upon insect oscillations, the second with the food relations of the Carabidæ and Coccinellidæ, the third with the food of the smaller fresh-water fishes, and the fourth treats of the first food of the common whitefish. The first brings out most clearly the fact that all passerine birds, even the seed-eating species, may be depended upon as aids against the canker-worm, and *presumably* against any other inordinately abundant insect; while the second shows that the Carabidæ are to a great extent vegetable feeders, the genera Harpalus and Anisodactylus especially; while the Coccinellidæ feed upon the spores of fungi, pollen-grains and plant-lice.

The so-called pirate perch (Aphredoderus), proved to feed

[1] Illinois State Laboratory of Natural History. Bulletin No. 6. Studies of the Food of Birds, Insects and Fishes. By S. A. Forbes.

almost entirely upon insects; sticklebacks eat about as much vegetable as animal substance; the small-mouthed atherinid *Labidesthes sicculus* is a purely animal feeder, dividing itself almost equally between insects and entomostracans; Fundulus and Zygonectes take but little vegetable food; the Cyprinidæ, with a long intestine and pharyngeal teeth with a broad grinding surface, feed principally upon vegetable food, ingesting much mud therewith; and in the Cyprinidæ, with hooked pharyngeal teeth and a short intestine, three-fourths of the food is animal. The smallest entomostracans form the first food of the young whitefish.

Exact observations of this nature are scarce, and of great value, and Mr. Forbes has begun a needed work.

SYMBIOSIS IN THE ANIMAL KINGDOM.—Professor Hertwig, according to *Nature*, at the last meeting of German naturalists, read a paper on this subject. This term, symbiosis, first suggested by De Bary in connection with certain phenomena of the vegetable world, is here extended to the whole organic system. As distinguished from ordinary parasitism, it is explained to mean the normal fellowship or association of dissimilar organisms which dwell together in a common abode for their mutual welfare. In the case of parasites the connection is altogether one-sided, one of the two organisms attaching itself to the other, and flourishing at its expense, as, for instance, the mistletoe on the apple tree. But in this newly-revealed phenomenon of symbiosis, which appears to pervade the whole biological world, both associates are mutually beneficial, and in some instances even indispensable to each other. They act, so to say, like two partners in a well-regulated business concern, coöperating in the work of life, taking part in all its toils and troubles, and honorably sharing the common profits. An illustration is drawn from the familiar hermit crab, one species of which, after taking possession of the first available empty shell, goes into partnership with a sea anemone *(Adamsia palliata)*. This lonely creature, bright orange spotted with red, attaches itself to the roof of the common abode in such a position that its mouth and prehensile apparatus are always turned toward the head of its associate. It is thus enabled to join in all the expeditions of the restless hermit crab, and conveniently share in the common plunder. In return for this service, the anemone protects his companion from his many enemies by means of the numerous long threads which it shoots out at the least alarm, and which are provided with millions of capsules charged with a stinging acid like that of the common nettle. So close is the compact entered into by the two partners, that both have become indispensable to each other, as appears from a series of experiments made at the Neapolitan Aquarium. If the crab be removed from his house, and this be stopped up so as to prevent his reëntering it, he will cast about for another shell, and

never stop until his old associate is also transferred to their new abode. A still more remarkable illustration is drawn from the *imbauba*, or candle-nut tree of South America, which strikes up an alliance with a species of small black ant to their mutual benefit. The whole subject of symbiosis, which naturalists are only beginning to study, is calculated to throw great light on the Darwinian theory of biological evolution. The various cases of fellowship between animals and plants of different orders, and even between members of the animal and vegetable kingdoms, show how, in the perpetual struggle for existence, the individual organism avails itself of the smallest advantage to secure a place in the household of nature. It often thus acquires marvelous habits of life, which it is afterwards unable to lay aside, and in consequence of which it becomes gradually modified in its bodily form and organization. Thus *abyssus abyssum invoca*, one change superinduces another, altered conditions require fresh combinations, and the organic world resolves itself into an everlasting ebb and flow of life, in which the individual counts for nothing, the species—itself transitory—for but little, and the sum of existence alone is considered in the self-adjusting scheme of the universe. Symbiosis thus leads at once to a broader and more searching study of various branches of human knowledge. To prosecute the subject successfully vegetable and animal organisms must be examined, normal and morbid conditions attended to, anatomical and physiological questions investigated. For this boundless theme belongs to a border land in which zoölogy, botany, anatomy, physiology and pathology meet as on common ground.

Collecting and Preparing Infusoria.—Dr. H. Fol, in a fourth contribution to the knowledge of the family Tintinnodea, says that in the natural sciences, method plays a principal part; but it is nowhere of greater importance than in microscopical researches. Here the fitness of the investigator consists much less in any particular perspicuity than in the art of bringing into view the points that he wishes to know. Hence the employment of a new method has enabled him to see clearly many things which he had previously been unable to see, or which he had seen imperfectly and misunderstood. The collection of the Tintinnodea in the sea is an easy matter. There is no danger of damaging them at the moment of their capture, seeing that their test, into which they withdraw at the smallest sign of danger, sufficiently protects them. They are pretty robust and swim briskly about in the bottles several hours after their capture, and at a time when many delicate animals are already dead or disfigured. It is not, however, at the surface of the sea, or under a bright sun, that we find them in the greatest abundance. In cloudy weather they rise to the surface more readily than in bright weather, and in the daytime they are found chiefly at a depth of several fathoms. For

their capture he employed a net of fine muslin of a conical form, attached to a ring about $50^{cm}$ in diameter. The bottom of the net presents a contracted opening, like that of a "well," which opens at the middle of a much smaller net made of silken sieve-cloth, with very fine meshes. This latter is attached to a ring, equilibrated by a fragment of cork. This net of silken gauze does not injure the animals at all, and it captures at least twice as many as the glass bottle which some naturalists substitute for it. It is easy to understand, in fact, that the impermeable walls of the bottle compel the water to turn in its interior, and cause eddies, which carry out a considerable proportion of the captured animals.

With creatures so active and so difficult to observe alive under a high power, it is of great importance to have a process which enables them to be fixed instantaneously in their natural attitude before they have had time to withdraw into their test, and which preserves faithfully the details of their structure.

Dr. Fol tried the various reagents most in vogue without attaining his purpose. With weak osmic acid he did not succeed in preserving the cilia of the peristome; and with a stronger dose the body became absolutely opaque; in both cases there was always a strong contraction.

Acetic acid, chromic acid and picro-sulphuric acid only gave him a fixation which was too slow, so that the animal died contracted in the bottom of its test. Finally he "succeeded with a reagent which is not employed in histology, perchloride of iron;" by its means he has obtained a considerable number of specimens of various species, fixed in a state of full expansion. These subjects, washed with alcohol and treated with gallic acid, present a brown coloration which is especially localized upon the nuclei, and renders them very visible; the other parts of the animal acquire a light-brown tint, which renders them easy to see.—*Journ. Roy. Microscopical Society.*

How the Boring Sponge penetrates Limestone and Shells. — In an essay on the biology and anatomy of the boring sponge (Clione), by N. Nassonow, assistant in the Zoölogical Museum at Moscow, published in the *Zeitschrift für wissenschaftliche Zoölogie* for Nov. 6th, the author attempts to answer the question how the sponge forces its way into hard calcareous bodies, and how it accomplishes its work of destroying shells, corals, etc. His observations were made in May and June, 1881, at the biological station at Sewastopol. For a long time, he remarks, different species of this genus of sponges have been known to live in the shells of numerous mollusks, and in corals, while Oscar Schmidt has described two species living in limestone, and Hancock found on the coast of Northumberland almost every stone bored in all directions by different species of Clione. Finally,

Tscherniawsky commonly found in the Black sea very large stones which were perforated like a sieve by colonies of Clione; these worked in conjunction with numerous boring Nemertine worms, annelids and bivalves, so that the durability of stone piers, wharves and other marine structures was impaired.

The question then arises how the Clione bores its way into the hard calcareous structure. Does it go on in a chemical or mechanical way, or does the sponge simply settle itself in passages previously bored by other animals? We must, he says, consider *a priori* that the parasite sponges are supplied for this purpose with special means or facilities which are wanting in the free-living sponges. Hence arises the second question: How has the parasitic mode of life expressed itself in the structure of the body? Nassonow set himself to the task of answering these inquiries. To observe how they set at work, he bred the sponges from the egg, cultivating them on thin, transparent plates of lime, and in this way could observe the operations of the sponge by transmitted light.

On June 11th he noticed a number of embryo sponges which had attached themselves to the upper surface of these plates as minute, thin, yellowish, round spots. In this condition the young sponge begins its work of destruction. At first it appears as a rosette-like mark. The sponge sends out fine offshoots into the substance of the plate, following the lines which form the outline or lobes of the rosette. June 12th, the little sponge had sent its protoplasmic roots deeper and deeper into the plate, finally occupying the part of the plate which corresponded to the rosette. Toward evening the whole rosette-like spot had disappeared from the upper surface, and soon had formed a small circle of little pits, each pit corresponding to a single lobe of the rosette. The little sponge had compressed into the minute pits the greatest part of its body, but on the upper surface, near it, lay a heap of broken calcareous particles of ellipsoidal form, the under convex surface being cut by the rootlets of the body out of the substance of the shell or plate. In this way the sponge exercises a chemical[1] and mechanical destructive agency, with less expenditure of energy. Instead of dissolving each single particle of lime, it dissolves a thin calcareous layer which corresponds to the convex upper surface of the particle. That the work is cut down by aid of the spicules is proved by the fact that they do not exist at this early stage.

All the lobes (10–15) of the rosette become eaten out in one day. Hence it results that the destructive energy of a fully-grown sponge, with all its branches and galleries, occupying a very considerable surface, is naturally very great.

[1] The sponge bores its passages, in all probability, by secreting an acid. To detect the presence of the acid would be difficult on account of the strong alkaline reaction of the sea water.

The remainder of the paper is devoted to histological facts and an attempt to show the relations of the sponge structure to its parasitic mode of life.

Polymorphism and Parthenogenesis in Mites.—A. Berlese states that the adult Gamasus, like all parthenogenetic forms, produces viviparously hexapod nymphs, which never develop ova till they reach the mother-stage. Both the larvæ and the nymphs are distinguishable by their soft hyaline epidermis and the complete absence of any reproductive organs. There are nymphs which ought to become males, and others which should become females; and this, which is the most frequent arrangement, may be spoken of as the normal series. In addition there are individuals which cannot be produced by the adults or the higher forms of the series, but they are derived from two distinct groups, which, like the adults, are of the ordinary, or of the extraordinary series. Thus *G. tardus* produces a special larva from which, by rapid metamorphosis, there is developed a larger octopod nymph. During the whole of its development this form is octopod and asexual; it molts as it grows, but does not seriously alter in form; at the later molts a slight difference may be detected between the future males and females, but there are no traces of any secondary sexual characters.

A detailed account is given of the metamorphosis of *G. tardus*, *G. coleoptratorum*, *G. stabularis* and *Trachynotus inermis;* in the last of these pædogenesis is especially well marked.—*Journal of Roy. Micr. Soc., April.*

Water-collecting Apparatus for Mites.—Mr. C. F. George states that he has used the following in searching for Hydrachnidæ, and has found no other piece of apparatus so efficient: A piece of thick brass wire is bent at about six inches from one end into a ring four or five inches in diameter. After connecting with some finer wire the two extremities of the ring, bend the stout wire at right angles to the ring, and continue it for about four inches. Then make another ring about one and a half inches in diameter, and there terminate the wire, leaving the small ring, however, not quite complete. The two rings will thus be parallel to each other. On the upper ring stitch a piece of tape, and to this sew a piece of muslin, made in the shape of a conical bag, and having its wider end affixed to the tape. Into the lower opening of this bag a small, wide-mouthed glass bottle, of about two ounces capacity, should be fastened by a piece of thread or fine string, and the lower ring is then sprung around the neck of the bottle. The other end of the brass wire, which was left projecting for about six inches, is now to be firmly lashed to a light cane or stick, and the apparatus is complete. In order to use the apparatus, move it gently backwards and forwards on the surface of the water, under the surface, or just above the bottom of the

pond, and among the weeds; the muslin will allow the water to pass through it, whilst any living organisms will be retained by the bottle. This can from time to time be examined with a pocket lens, and when it is found to contain anything, the lower ring of wire can be slipped off and the neck of the bottle pushed up through the upper ring, inverting the net. The contents may then be poured off into another bottle, and after rearranging the apparatus, fishing may go on again. The object of the piece of wire connecting the two ends of the net is to keep all stiff, so that the bottle can be turned in any direction, and yet both the upper and lower mouth of the net will remain open.

Spawning of the Axolotl.—Last year Mr. E. G. Blackford received two specimens of the Mexican laxolot *(Amblystoma mexicanum)*, which had been bred in France. They were albinos, as is often the case, and attracted much attention from visitors to Fulton Market. Last March the female laid many eggs—perhaps a hundred and fifty—and a few were hatched. To the surprise of all she has just laid another batch, but it is too soon to say if these will produce young. Some of the eggs have been sent to Mr. J. A. Ryder, of the U. S. Fish Commission, who will study their embryology if they prove to be fertile. We do not think it is generally known that this batrachian spawns twice a year.—*Forest and Stream.*

Why Salamanders are not Eaten by Frogs.—About a year ago the writer captured a leopard frog in a meadow. It had not lost the direction of the water, for, on being pursued, it took long leaps toward the brook, which it could not see. It was brought home and a place prepared for it in a fern case. A vessel of water surrounded by moss and stones and growing ferns was covered by a large glass case. In this prison the frog passed the entire winter. He had for company two red salamanders and a younger brother of his own kind. The latter disappeared during the first day, eaten by the larger amphibian, and after him went every creeping and flying thing whose size would permit it to be swallowed, except the salamanders. It was amusing to see Rana undertake a meal of salamander meat. He tried it several times before he learned better. His little victim would almost disappear from view down the capacious gullet, but the pungent liquid thrown out from all parts of the body seemed too much for the frog's palate, and it was invariably ejected. After this trial of strength the three prisoners became great friends, and the salamanders would often crawl over the frog, he winking at their familiarity and rarely paying any attention to them.—*W. W. Thoburn in Scientific American.*

Food of Snakes.—When out after prairie chickens in August last, I crossed a large ditch which was all dried up except some small pools in which were large numbers of the common bream

or sunfish, *Pomotis vulgaris*, about one inch in length. In one of these pools two of the common garter snakes, *Eutænia sirtalis*, were catching these little fishes. Happening to pass the same place the next day, I found the pools dried up and the fish all dead. I was much surprised to see one of these snakes hastily moving away with one of the dead fish in his mouth. Is it common for these snakes to feed upon fish? Is it not uncommon for any serpent to take as food an animal already dead?—*E. A. Gastman, Decatur, Illinois.*

California Long-billed Marsh Wren.—June 18, 1882, a friend and myself started for Soap lake, San Felipe, with the intention of getting a few sets of eggs of this bird. Arriving there we pulled on our long boots and plunged into the tules in different directions. After an hour's hard work we returned and reported—one set of badly incubated eggs. My friend's experience was about the same as mine. I had found and examined some twenty-five nests, and of that number only three had been lined and used; two had been deserted, the third had the abovementioned set. The other nests were of the same appearance outwardly, being woven of coarse bark of tules, but without the soft wooly lining of fine shreds of cotton tule and ducks' feathers. Some looked new, others old, and were situated, mostly, just out of reach in the taller clumps of tules. I saw but few birds, and these were fearless, approaching within two feet and looking me in the eye. Now, what can be the object of all these extra nests? Do the other birds build them for a shelter, and in case they are disturbed can immediately occupy another nest, or like children who build mud houses for amusement, and because they have nothing else to do? I hope to make another trip to the place when I have more time, and to be in better season.—*A. D. Butterfield, San José, Cal., in Oölogist and Ornithologist.*

Zoölogical Notes.—*Infusoria.*—The parasites found in the oysters of Arcachon and La Rochelle are the subject of a communication of A. Certes to the French Zoölogical Society. Among these are the following Infusoria: *Hexamita inflata* Dujardin, *Trypanosoma balbianii* Certes; a species of Enchelyodon which conjugates after developing actively by fissiparity, and after conjugation again becomes actively fissiparous, and *Prorocentrum micans* Ehrenberg.

*Cœlenterates.*—M. Mérejowsky has contributed to the Bulletin of the French Zoölogical Society an account of the development of Obelia. Before fecundation the eggs develop at the expense of the endodermic cells; the nucleolus takes the form of a chaplet bent upon itself, the grains of the chaplet separate and divide, and the ripe egg before fecundation does not present the least trace of a nucleolus in its entirely homogeneous nucleus. The blastula is composed of cells of very various sizes, its walls are

pierced by pores, and the endoderm is formed by the immigration, one by one, of the blastodermic cells, this immigration taking place only at the posterior part of the larva. In further development the ectoderm appears to be double, but this appearance is due to a differentiation in the protoplasm of the cells; and the gastric cavity appears first as a fissure in the center of the endodermic parenchyma. The perisarc of the hydroid form is very probably the product of the secretion of special unicellular glands, disposed in the ectoderm. The medusa does not necessarily die after it has laid its eggs. Under favorable conditions it lives, but changes in form, the umbrella relaxes, turns upwards, and ultimately forms a sac having a few tentacles around its narrow opening. Meanwhile the pendant manubrium loses its tentacles, and forms the base of the hydra-like animal, while the mouth narrows to a pore, by means of which the animal fixes itself. The cavities of the manubrium and of the larger sac formed from the reversed umbrella ultimately communicate, the ectodermic cells lining the latter each acquire a vibratile cilium and become endodermic, and the upper opening does duty for a mouth.——Dr. Otto Hamann (*Jen. Zeitschrift für wissenschaft.*, 1882) gives the results of his researches into the structure of the Hydrozoa. In the first chapter he treats of the various parts of these organisms; in the second of their polymorphism, the homologies between medusoid gonophores and medusæ, their embryology, the relationship between the hydroid polyps and the Siphonophora and Anthozoa, and their classification. He divides the entire class into the legions Hydropolypi and Coralpolypi, the first containing the orders Intæniolatæ, characterized by simple stomachs and polyps contained in capsules, and Tæniolatæ, with folded stomachs; and the second embracing the Milleporidæ and the Stylasteridæ. The numerous diverticula of an anthozoan are a complication of the foldings of the Tæniolata, and the anthozoan larva, with four septa, recalls the structure of the tæniolate Hydrozoa. In a second part Dr. Hamann goes more thoroughly into the histology and anatomy of some forms of Tæniolatæ and Intæniolatæ, and describes two new species (*Podocoryne haeckelii* and *Plumularia fragilis*). A third part is devoted to histiogenesis.——Another article by the same naturalist treats of the anatomy of the nettle capsules, etc., of Hydra. The researches were carried on at Heligoland and at the Naples Zoölogical Station.——Mr. R. E. C. Stearns describes a new Pennatulid from Japan under the name of *Radicipes pleurocristatus* (Proc. U. S. Nat. Mus., 1883, p. 96). This species has a furcate basal end, well adapted for fixation in a muddy bottom. Mr. Stearns also brings together numerous accounts tending to prove that Pennatulids with simple axial rods have considerable swimming powers. ——A recent memoir of the Museum of Comparative Zoölogy is devoted to the Porpitidæ and Velellidæ. Professor Agassiz

considers this small group of Hydrozoa, which is found wherever the influence of the Gulf Stream extends, to have greater affinity to the Tubularians than to the Siphonophoræ proper. *Velella mutica* is extremely abundant in the Straits of Florida, and sometimes finds its way north to Newport and Nantucket. It is larger than the Mediterranean species. The young differs greatly in appearance from the adult. The Florida Porpita, *P. linneana*, is also much larger than the Mediterranean species. In nearly all the Tubularians the base of the cœnosarc extends either as filaments or rootlets over a considerable space; these filaments are tubular, and, in Hydractinia especially, the base of the cœnosarc resembles in structure the float of Porpita. The great difference is that in the Porpitidæ and Velellidæ the extension of the cœnosarc is consolidated into a float from which the polyps depend.

*Worms.*—M. Megnin has contributed to the Bull. de la Soc. Zoölogique a study of the organization and development of Echinorhynchus, the most important result of which study is the proof of the existence in the larvæ of a well-developed digestive apparatus which atrophies without completely disappearing in the adult. In the latter the great development of the reproductive apparatus and the pronounced activity of the generative functions overshadow all other functions. The presence of a bifurcated intestine brings Echinorhynchus nearer the Trematodes and removes them from the Nematodes near which there was a tendency to place them.

*Tunicates.*—W. K. Brooks (Zool. Anzeiger, May, 1882) claims that the solitary Salpa is a true female, which produces a chain of males by budding and discharges an egg into each of them before birth. These eggs are impregnated while the zooids of the chain are very small and sexually immature, and they develop into females which give rise to other males by budding. Thus there is a remarkable difference in the mode of origin of the two sexes, but since both are the offspring of the solitary Salpa, one by budding and the other by sexual reproduction, it is not a case of alternation of generations. This view, first put forth in the Bull. Mus. Comp. Zoöl., No. 14, is again asserted in answer to Salensky, who claims that what Professor Brooks styled an ovary is but a mass of undifferentiated embryonic cells which gives rise both to the ovaries and to the digestive organs of the chain salpæ. Examination with a high power proves, however, that the organ is a true ovary containing eggs, while the digestive organs of the chain salpæ are not formed from it.

*Crustacea.*—In the Proc. U. S. Nat. Museum Professor S. L. Smith gives a list of the Crustacea dredged upon the coast of Labrador by the expedition under the direction of W. A. Stearns, and also gives a review of the marine Crustacea of that region,

including those collected by Professor Packard in former years. ——In the transactions of the Kansas Academy of Science F. W. Cragin gives the results of his studies of the Copepoda of the fresh waters about Cambridge, Massachusetts. After premising that the genus Cyclops has been the *bête noire* of American naturalists, since, though upwards of sixty valid species have been described in Latin, German, Danish, Dutch or Russian, only three were previously recorded from North America, he proceeds to identify six previously-described species, and to describe four more. The paper concludes with a translation of Poggenpol's descriptions of eight species of Cyclops.——The report by Mr. Harger upon the Isopoda dredged on the east coast of the United States during 1880, by the U. S. Coast Survey steamer *Blake*, contains descriptions of *Cirolana impressa*, *Rocinela oculata* and *Syscenus infelix*, all new species, and of four other little-known species.——MM. Regnard and Blanchard contribute to the Bulletin of the French Zoölogical Society proofs of presence of hæmoglobin in the blood of Apus. The blood of this crustacean is red, though less so than that of a vertebrate, and can be seen through the carapace at the anterior extremity of the animal. Spectroscopic examination showed that the red color is due to hæmoglobin, which is, however, as appears to be the rule in invertebrates possessing it, dissolved in the plasma.

*Arachnides.*—M. Megnin (Bull. de la Soc. Zoöl. de France) contributes some further information respecting *Cheyletus heteropalpus*, one of a group of Trombidians which live among the roots of the hairs of mammals, or under the feathers of birds, not to absorb the blood or the secretions of their hosts, but to chase and kill their real parasites. *C. parasitivorax* lives among the hairs of the rabbit in order to devour the Listrophores parasitic upon them, while *C. heteropalpus* and *macronychus* capture the Sarcoptidæ of birds. While dissecting a *Cardinalis fulgens* M. Megnin perceived numerous white spots upon the central part of the skin of the breast, and upon examination found them to be composed of fine interwoven fibers, covering a group of eggs in different stages, together with some recently hatched young which could be identified as *C. heteropalpus.*

*Fishes.*—Twenty-five new species of fishes from Florida are described in the Proceedings U. S. Nat. Museum (Sept., 1882), and Messrs. Jordan and Gilbert describe a new goby from Vancouver's island.——J. A. Ryder (Bull. U. S. Fish Commission, Sept., 1883) has a note on the thread-bearing eggs of Menidia. The eggs of this little fish have four long filaments attached to a small area on one pole; each of these threads is about eight times the length of diameter of the egg, and is apparently composed of the same tough material as that of the egg-membrane. These filaments uncoil from around the egg after oviposition, and as they have a

tendency to entangle with those of other eggs so as to form bunches or strings, Mr. Ryder suggests that they may be the means by which the parent fish is enabled to suspend its ova to the stems or leaves of plants. The ovary of a full-grown Menidia does not contain more than 300 eggs, while the silver-gar, the eggs of which have filaments scattered over the whole surface, contains 800 to 1000 ova. He notices that the number of ova produced by fishes is in some way proportioned to their chances of survival, and that in this respect species with thread-bearing eggs hold an intermediate position.——The same naturalist has an interesting notice of the breeding habits and development of *Amiurus albidus*, as exhibited by examples in confinement. The eggs were about 2000 in number, and formed a mass about eight inches long, four inches wide and one-half to three-fourths of an inch thick. Their surfaces were adherent but not gelatinous, so that intervening spaces remained between them for the passage of water. The female took no further notice of the eggs after depositing them, but the male watched carefully over them until the young had escaped from the egg-membranes, hovering over the mass and forcing fresh water through it by the rapid vibration of anal, pectoral and ventral fins. All of those left in his charge came out, while an attempt to hatch a portion of them artificially was less successful. The water-space in the egg was from the first filled with a great number of free corpuscles, a character not before met with (so far as Mr. Ryder is aware) in any other Teleostean egg. From the sixth to the eighth day the young were hatched, and on the fifteenth would feed. The parent fishes would often take into their mouths pieces of the liver thrown to the young, together with the young that were hanging to them, but it was observed that the young fishes were invariably ejected uninjured.——An elaborate and richly illustrated memoir of a hundred pages, on the brain of the lamprey eel, by F. Ahlborn, appears in the *Zeitschrift für Wissens. Zoologie* for Nov. 6. It treats not only of the morphology, but also of the cellular structure.——*Nature* records the fact that Mr. Morton states that *Ceratodus forsteri* in Mary's river, Queenland, from June to August goes in pairs, that they make slight indentations in the muddy bottom in from six to ten feet of water, in which the spawn is deposited; the male and female fish remain near the spawn, and are not then easily disturbed. They frequent the same place every year, and the spawn is like that of frogs. Mr. Morton has taken it and hatched it in a tub of water, keeping the young alive for some weeks.——In his paper on the oviducts of the smelt, in the Proceedings of the Zoölogical Society, Professor Huxley, after stating that, as is well known, Lepidosteus presents an example of a Ganoid with oviducts like those of the higher Teleostei; in the smelt, on the other hand, "we have a Teleostean with oviducts like those of the ordinary Ganoidei." He concludes that "there are no two

large groups of animals for which the evidence of a direct genetic connection is better than in the case of the Ganoids and Teleosteans. Two other supposed distinctive characters between these two groups have been shown to be not well founded, as Boas has recently discoverd a *conus arteriosus* in Butirinus and other bony fish, while a spiral valve was long ago discovered by Valenciennes in a bony fish (*Chirocentrus dorab*). Moreover, Huxley claims, with Balfour, that in the brain of Lepidosteus the epithalami "become exactly similar to the so-called 'cerebral hemispheres' of the bony fishes;" he then adds, "In all the Teleosteans, in fact, the bodies called 'cerebral hemispheres' are not the exact equivalents of the structures so named either in the higher Vertebrata or in the Selachians, but are *epithalami*, just as in the Ganoids. Thus, in cerebral structure, as in other respects, the Ganoids and the Teleosteans are as closely related to one another as they are different from the Selachians."

*Batrachians and Reptiles.*—Prof. E. D. Cope (Proc. Acad. Nat. Sci. Phila.) contributes considerable additional information respecting the geographical distribution of various batrachians and reptiles in Western North America. Among other results, the range of *Spea hammondi* is extended to the Rocky mountains, a new Scaphiopus is described from the Great Basin, and *Rana pretiosa* is proved to extend into that district. The Northern Pacific fauna, especially represented by *Bascanium vetustum*, *Rana pretiosa*, and *Bufo columbiensis*, extends in Idaho to the Rocky mountains. A comparison of the principal families and genera of cold-blooded vertebrata found in the Nearctic, Sonoran, and Neotropical regions is given, in order to show the far greater relationship of the Sonoran to the Nearctic than to the Neotropical.

*Birds.*—In the proceedings of the Zoölogical Society, Mr. W. N. Parker states that on the whole the respiratory organs of the South American ostrich (Rhea) very nearly resembles that of the Carinate birds; but in several points it shows an intermediate condition between the latter and Apteryx.——The Bulletin of the Nuttall Ornithological Club for Jan., 1883, contains, among other good articles, notes on a lateral hermaphrodite green-tailed towhee, though in plumage it resembled the females. B. F. Goss describes the breeding habits of Maximilian's jay and Clarke's crow, and G. Holtenhoff, Jr., describes the nest and eggs of LeConte's thrasher. ——Mr. N. C. Brown has found specimens of *Zonotrichia albicollis* unquestionably in their first year, but clad in a dress practically identical with that of the maturest spring birds. He also finds that males of the two North American species of Loxia often assume their full reddish dress in the autumn of their first year.——Polygamy in the blue bird and marsh blackbird is recorded by Professor F. E. L. Beal. In the April number the vernal migration of warblers on Wolf river, Wis., is described by F. L. Grundtvig.——A hybrid sparrow (*Zonotrichia albicollis* + *Junco hiemalis*) is discussed by

C. H. Townsend, while Mr. J. A. Allen notes certain exceptions to the law of increase in size northward among North American birds.——The July number contains faunal lists and notes, with some notes on habits.——Dr. Coues records, through G. F. Crook, a curious case of susceptibility of a caged red linnet to color. If anything blue is shown, it becomes terribly excited, and utters painful cries.——H. W. Henshaw records an instance of semi-domestication of the California quail, while F. Stephens describes a California bird-crane, *Dendræca occidentalis*, being the most abundant migrants.——A supplementary list of the birds collected by Dr. Dybowski, in Kamtschatka, given in a recent issue of the Bull. de la Soc. Zoöl. de France, raises the total number, including the swimming birds, to a hundred and thirty-four. A new species of Astur, *A. candidissimus*, is described, also *Hirundo kamtschatica*, a species of Troglodytes, and *Phyllopseuste homeyeri*. ——In the Proc. U. S. National Museum, Mr. R. Ridgway describes *Psaltriparus grindae* and *Junco bairdi*, also a new variety of *Lophophanes inornatus*, all from the MS. of and from examples sent by Mr. L. Belding from Lower California. *Anthus cervinus* Pallas, before thought to be exclusively Asiatic, is also noted as occurring in Lower California.

## PSYCHOLOGY.

INTELLIGENCE OF THE CAT.—One of the attractions of my home has ever been the number and variety of the pets we have kept, and to which liberty has generally been accorded. Thus they had an opportunity to develop their natures without great restraint; and I, to gratify my love for the observation of character in animals. Prominent among these pets were gophers, chipmunks squirrels—black, gray, red and flying—robins, mocking-birds, cats and dogs, which were entirely free, and a robin, several canaries, a fox, a bear, a bald-headed eagle, and several owls which were somewhat curtailed in their privileges.

As the intelligence of the cat has called forth some notice of late, let me add a few facts which have come under my observation. On introducing a new puss into the "happy family," I found that notwithstanding her reputed treacherousness and selfishness, a few kind, decided words, with considerable watching, and an occasional gentle spat, so well convinced her of the rights of others, that so far as those individuals are concerned in about two weeks she was conquered, and could be trusted to be in a room or out of doors alone with them. A young snipe being brought me, and all my efforts at taming it proving futile, for it *would* run away, I wanted the old cat to catch and have it. She would not touch it, helped us to "corner" it, but would not bite it, and after it was killed, she still refused to eat it, seeming to recognize it as one of her clan.

Many think cats have a memory of places only and not of per-

sons and things. Of the contrary we had proof. One summer during our absence, the house and pets being left with a faithful servant, Dick, a rare and highly prized canary, escaped by a loose wire in his cage. Kit saw him, but did not recognize the bird in the tree, as the canary of the cage, so caught him, and as usual with her prey came to the house to be praised. The girl saw little Dick and taking him away—though dead—suddenly seized the cat, and attempted, with a hatchet, to cut her head off. Fortunately for Kit, the edge was dull and the aim poor, so only a little fur was cut, and she escaped for dear life to the barn. From that time on, only faint glimpses of puss were seen for nearly a month, despite kindly calling, and coaxing morsels, but on our return, we had not been in the house a half hour before puss came in so delighted to see and welcome us. From that day till two years after when she died, every time the deathly hatchet was taken up by the girl to split kindlings, pound steak, or what not, the cat would rush away as though pursued. The rest of the family could use the same hatchet, and for the same purposes as much as we pleased and she would sit quietly by.

We have had another illustration of personal attachment and not merely local. A neighbor had a house cat five or six years old. The family removed, leaving Tip behind, and another family came in. Tip forthwith forsook the house and came to our barn, but would allow none of us to rub him for two years and a half. Finally, as the winter of '81–2 (which proved so very cold) approached, we found him at our door begging entrance. Like one who had gathered up some grains of wisdom, he immediately accommodated himself to his new surroundings, and we could scarcely get rid of him at all, but when spring came, and the family, now absent three years, returned, Tip was missing and we found him safely ensconsed in his former home, nor has been back to us but *once*, seemingly, to bid us good-by. Was it the consciousness that he was old and infirm, unable to stand, unaided, the severities of the approaching winter, or had our cats told him of their kind home that he thus applied at our door for support and protection? It was surely memory of persons rather than mere place which induced his final return to his rightful owners.

Notwithstanding our old mother cat was usually so careful and rarely disobeyed, one Sabbath we left her alone by mistake in a room where were some freshly mounted birds. On our return from church we saw the floor strewed with feathers and divined the cause. She had torn and chewed the poor skins into a forlorn sight, and was herself very sick from the arsenic, corrosive sublimate, &c., used on the skins. We instantly forced her to swallow a supply of fresh lard and white of egg, and succeeded in overcoming the poison so that she recovered. Her appetite was poor, and she seemed to have difficulty in eating. After several

weeks we examined her mouth and to our surprise *every tooth had dropped out.* We thought we should have to kill her, but she seemed to be growing better, so we let her live. Always a great mouser, after this she could only catch the mice and rats, and conscious of her inability to bite them, brought them to us to kill, scratching at the door and making a certain mew which indicated she had something. The man used frequently to take her to the oat bin, and she would catch the intruders there as fast as ever, bringing each one to him to finish. We kept her for two years after this serious experience, always feeding her bread and milk, and bread and coffee and cutting her meat up very fine for her. She then sickened and soon was consigned to the garden Necropolis of the " happy family."

Do not these facts further demonstrate a goodly degree of intelligence in the cat?—*Mary E. Holmes, Rockford, Ills.*

SENSE DISCRIMINATION.—In a chapter on sensitivity, Galton, in his "Inquiries into Human Faculty." concludes that contrary perhaps to the usual impression. a delicate power of sense discrimination is an attribute of a high race, and that it has not the drawback of being necessarily associated with nervous irritability. The discriminative faculty of idiots is curiously low, they hardly discriminate between heat and cold, and their sense of pain is so obtuse that some of the more idiotic seem hardly to know what it is. Galton found that as a rule men have more delicate powers of discrimination than women, and that the business experience of life seems to confirm this view. For example, the tuners of pianofortes and the tasters of wine and tea, the sorters of wool and the like, are men.

Experimenting on a number of boys at a large educational blind asylum, he found that the blind lads who showed the most delicacy of touch, barely reached the mediocrity of the various sighted lads of the same age whom he had previously tested. He finds that the guidance of the blind depends mainly on the multitude of collateral indications, to which they give much heed, and not in their superior sensitivity to any one of them. Those who see do not care for so many of these collateral indications, and habitually overlook and neglect several of them.

Notwithstanding many travelers' tales, Mr. Galton has thus far been unable to obtain satisfactory evidence of any general large superiority of the senses of savage over those of civilized men. " My own experience, so far as it goes, of Hottentots, Damaras and some other wild races, went to show that their sense discrimination was not superior to those of white men, even as regards keenness of eyesight."

A PAIR OF CATASTROPHES.—*Prudential killing by a Cat.*—A cat near Red Bank, N, J., last month had a litter of kittens, one of which was a monstrosity. It had seven legs, of which one had

two feet. It had two bodies joined at the one neck, which supported one head, which had two mouths, one under the other. After a few hours the mother cat deliberately killed the kitten by biting it through the neck. Surely this was the exercise of the mother's reason on the line of the survival of the fittest.—*S. Lockwood.*

*Feline Prescience.*—I must give a fact which was communicated to me many years ago by an old physician, of which the good old man assured me he was an eye witness. In his house were two cats, each with a litter of kittens but a few days old. One of the cats was very young, it was her first litter, and the older cat was her mother. It was noticed that the younger cat did not seem well. Each one had her litter by herself, although both were in the same room. As the old cat lay suckling her own litter, the young cat came to her mother and made a low mewing, then went to her own litter. The old cat followed her and immediately began removing the grand-kittens, adding them to her own. The truth was she had adopted them, and seemingly at the request of their mother, for not many minutes more had elapsed before they were orphaned by their mother's death.—*S. Lockwood.*

Poetry in Dreams.—It is not unusual for persons addicted to dreaming to compose verses, blank or rhyming, but it is rarely that such productions are remembered on waking. A near relative of one of the editors, known by his family to possess considerable facility in this direction, frequently dreamed in verse. On a few occasions he remembered a few lines of these productions. We append them as curiosities. The first is single line:

"The copest leaves do hum exasperated horrors round!"

The second:

"The ship of the desert is vanished forever,
Like music dried up in the bed of a river."

Another:

"Emaciated swallows floating through the air,
Two legs flung out behind, and two before."

—*C.*

## ANTHROPOLOGY.[1]

Chinese Coins in British Columbia.—In the summer of 1882 a miner found on De Foe (Deorse?) creek, Cassiar district, Br. Columbia, thirty Chinese coins in the auriferous sand, twenty-five feet below the surface. They appeared to have been strung, but on taking them up the miner let them drop apart. The earth above and around them was as compact as any in the neighborhood. One of these coins I examined at the store of Chu Chong

[1] Edited by Professor Otis T. Mason, 1305 Q street, N. W., Washington, D. C.

in Victoria. Neither in metal nor markings did it resemble the modern coins, but in its figures looked more like an Aztec calendar. So far as I can make out the markings, this is a Chinese chronological cycle of sixty years, invented by the Emperor Huungti, 2637 B. C., and circulated in this form to make his people remember it.—*James Deans.*

FUEGIAN ETHNOLOGY.—Professor A. H. Keane, in *Nature*, August 9, reviews a paper in Guido Cora's *Cosmos* for May, written by Lieut. Bove, of the Italian Antarctic expedition, in which occur some interesting details on the Fuegians. The archipelago is occupied by three races, the Alacalufs in the west, the Onas in the east, and the Yagans in the south. The latter, extending from the north side of Beagle channel southward to Cape Horn, appear to be the true aborigines, driven to their inhospitable islands by the other two tribes intruding from the mainland. The Onas, who are clearly of Tehuelche origin, penetrated from Patagonia across the eastern arm of Magellan strait into the large island of King Charles South Land. The Alacalufs, of Araucanian stock, made their way from the Chilian Andes, across the western arm of Magellan strait into the islands from Cape Pillar to Stewart island. The Onas number about 2000, the other two about 3000 each. The Yagans appear to have been originally of the same stock as the Alacalufs, they are below the middle height, though nearly as tall as the Araucanians. They are distinguished by low brows, prominent zygomatic arches, large pendant lips, flat nose, round face, loose, wrinkly skin, thin extremities, legs curved outward, hair coarse, lank, long and black, with few exceptions. They neither tattoo nor paint, and are scantily clad. Their houses are wretched hovels, but their beechwood canoes are skillfully made. In these frail craft they navigate the stormy channels, pursuing the whale and the dolphin beyond sight of land. The Yagans are polygamists and exacting of their wives, who are prolific, however, and industrious. Many children succumb to the climate, and those who survive soon shift for themselves. Little of social organization exists beyond the family and the hunting party. The belief in the supernatural and in a future existence seems to be little developed. The statement that the language contains 30,000 vocables is received by Mr. Keane with extreme caution.

THE ATLANTIS.—M. E. F. Berlioux, professor of geography in the faculty of letters, Lyon, has just published a learned work entitled "Les Atlantes: histoire de l'Atlantis et de l'Atlas Primitif, ou Introduction a l'histoire de l'Europe" (Paris, Ernest Leroux, 1883, pp. 170, 8vo). The question of Atlantis rests upon an Egyptian tradition related by Solon, and preserved by Plato in the Timæus and the Critias. For all the events related in this tradition, the dates and the geographical positions, there is always

a double interpretation, one giving to the statements exaggerated meanings, the other regarding them as ordinary facts accessible to discussion. Now students have considered the subject from the first point of view only, regarding Atlantis as a continent in the center of the Atlantic ocean, from which a great expedition was made nine or ten thousand years before our era, and which was one day engulfed in the sea. In this form the legend is so seductive to the imagination as to place patient research out of the question. Even those who have given any historic value to the narrative have placed the events so far back as to antedate criticism.

In fact, the lands of the Atlas are not only rich in souvenirs found in books, but they are filled with monuments some of which belong to the most remote ages and of which it becomes us to study the history. The dolmens are more numerous than those of Armorica, and it is here that we must seek one end of that long line of megalithic monuments whose other extremity is to be found in India. The tumuli mark a second epoch, and their lines are not arrested by the ocean, they reappear on American soil. Along side of these rude structures appear the remains of others belonging to a still higher civilization. Indeed, M. Berloux has sought to reconstruct the history of this Northeast African land. Those of our readers who attended the Montreal meeting of the American Association will recall Mr. Haliburton's paper on the same subject, and they will be pleased to know that Mr. Haliburton is at this time traversing the edge of the Great Sahara with the classic authors in his hand.

THE GERMAN ANTHROPOLOGICAL SOCIETY. — The fourteenth general meeting of the German Anthropological Society was held the present year at Trier, on the 9th, 10th and 11th August, Professor R. Virchow, president. The preliminary programme is devoted to the general business of the meeting, and mentions only a few of the papers to be read.

THE WESTERN SCIENTIST.—Ottumwa, Iowa, is to be the home of a new periodical devoted to science, and Mr. Crawford is to be the editor. The first number presents a comely appearance, though most readers object to quarto periodicals. Mr. Samuel B. Evans contributes a paper on the Des Moines Valley mounds.

THE GREAT INDEX CATALOGUE.—Volume IV of the "Index Catalogue of the Library of the Surgeon-General's Office, U. S. Army," has just appeared. There are two things in these volumes which we recommend to all anthropologists. The first is the alphabetical list of abbreviations of periodicals and societies; the whole subject is in dire confusion elsewhere, but here it is reduced to a rigid system. The second valuable thing is the great number of references to matters eminently anthropological. In

the present volume one should examine the words, *ear*, *Ecker*, *education*, *embalming*, *embryology*, *emigrants*, *emotions*, *engineering* (sanitary), *epidemics*, *ethics of medicine*, *ethnology* (seven pages), *eunuchs*, *evidence* (medical), *evolution* and *face*. Indeed many anthropological references occur under more general words, such as *eye*, *face*, etc.

INDIAN NAMES OF WATER-COURSES.—Some one has said that the perishable is, after all, the most enduring. There is nothing in art more fragile than pottery or glass, yet either of them in its fragments outlasts bronze or marble. The same is true of words. Some of the tribes once puissant in the States east of the Mississippi have absolutely faded from the earth, yet they have left the evidences of their former power in the names of the natural features. Mr. H. W. Beckwith, of Danville, Illinois, has done a good service in publishing a list of these names for Indiana, in the State Geological Survey for 1882. Many of the titles were collected and defined by the late Daniel Hough. An excellent map accompanies the paper.

THE MAUMEE.—Ottawasepoie, *Ottawa river*, by the Shawnees. Cagharenduteie, *River of the standing* rock, by the Wyandottes.

THE ST. MARY'S.—Cokothekesepoie, *Kettle river*, by the Shawnees.

THE WABASH.—Wauba, *white*, and Wabish ,*water*, in Algonkin. Quiaaghtena, in Iroquois.

THE MISSISSINEWA.—From missi and assin, with ewa, inanimate termination, signifying *River of great stones*.

TIPPECANOE.—Kenongé, *the long-billed pike*.

RED-WOOD CREEK.—Musqua-metgi-sepe, *Red-wood river*, in Ojibwa.

PINE CREEK.—Puckgwunnashgamucksepe, *white pine tree of the bark-peeling kind*, in Ojibwa.

WILDCAT.—Pishewa, in Shawnee, Ojibwa and Miami.

KANKAKU.—Theakiki, *wolf land*, in Mohegan.

IROQUOIS.—Mockabella, from moqua, *bear*, in Kickapoo. Pickamink, *beaver*, in Pottawattomi.

BEAVER LAKE.—Sagayiganuhnickyug, *the lake of the beavers*.

WHITE RIVER.—Opecomeecah, in Delaware.

VERMILION.—Piaukeshaw, *red earth*, *burnt earth*.

EEL RIVER.—Kenabegwinnmaig, *Snake-fish river*.

OHIO.—Oio, *beautiful*, in Iroquois. Akanseas, by Alliinies and Illinois, because the Akanseas formerly dwelt upon it.

THE KANAKAS OF NEW CALEDONIA.—The people of New Caledonia are the subject of a paper by Baron L. de Vaux, who has added to his own experience the knowledge gained by consulting the works of others. The islands are not remarkable for the luxuriance of their tropical growth, because the geological formation is not favorable. The people of to-day also seem to be in a state of degradation, not being engaged in those great and elaborate enterprises which distinguished their ancestors, such as long aqueducts, terraced plantations of ignames, fortifications, etc. The New Caledonians are not so dark as the Negroes, but more

darkly colored than the Polynesians. They have crisped hair, salient lips, noses artificially flattened, and the ears pierced in the lower lobe. The beard is quite abundant, although many do not allow it to grow. They wear no clothing. The height of the women, poor creatures who are only beasts of burden, is below the mean. Pretty up to the fifteenth year, they soon become decrepid by reason of severe toil and harsh usage. Old age is rare. Frequent wars, chronic diseases, epidemics, carelessness about the laws of health, sudden changes of occupation, and above all, the enfeeblement of the mothers, are sufficient to account for the brevity of life. The women belong to the tribe and to their purchasers, hence courtship and marriage in a true sense are unknown. Betrothals take place early, and are effected by the exchange of gifts, they are binding only when the bachelor sends to his fiancée a collar of a certain pattern. Finally, to complete the engagement, both drink from the same cup a fermented liquor specially prepared. Infidelity in the wife is punished by precipitating her from a celebrated cliff. The pastimes of the men consist of athletic sports, and they drive away dull care with the music of a rude flute and the recitation of ancient legends. One of their favorite weapons is the *sagaie*, which they hurl by means of a short cord, looped at one end for the forefinger, and knotted at the other to make fast temporarily to the shaft. Those who have seen a seine landed by men with just such a looped and knotted cord passed around their shoulders and wrapped once around the seine rope, will understand the working of this savage sling. The paper of Baron de Vaux abounds in useful information which the want of space does not even permit us to mention (*Rev. d'Ethnog.*, II, 327-354).

FRENCH ETHNOLOGY.—The fourth part of Vol. II, *Revue d'Ethnographie*, Paris, contains the following original memoirs:

The Ghiliaks, from the latest sources of information. By J. Deniker.

The use of Mollusks among ancient and modern peoples II. Mollusks of the tombs of Equador and New Guinea (6 figs.). By A. F. de Rochebrune.

Ethnographic observations in the peninsula of California and Sonora (5 figs.). By H. Tenkate.

The Kanakas of New Guinea (13 figs.). By Baron L. de Vaux.

The Ghiliaks are that people who live at the mouth of the Amoor and on the adjacent shore of Saghalin. They belong, with the Yukagirs, etc., to the vast family of tribes called by Schrenck the Paleasiatics.

The use of mollusks among the S. American aborigines of the Pacific coast was very restricted, both as regards species and classes of specimens, and this fact is more apparent in Ecuador and New Grenada, than in Peru.

The southern peninsula of California is almost devoid of interest to the anthropologist. Ancient relics are rare, and the pure

blood Pericuis and Coras give place to mixed-bloods, in which the foreign element has almost entirely obliterated every aboriginal trace.

The Kanakas of New Caledonia are of Negrito stock, and the Baron de Vaux has diligently supplemented his own personal observations by the study of original authorities.

The last thirty pages of the number are devoted to reviews, reports of meetings, expositions and collections, correspondence, news and bibliography.

The third part of Vol. XVI of *Rev. de Linguistique*, Paris, is devoted entirely to Sanscrit and Hindustanee.

The second fascicule of the *Bulletins de la Société d'Anthropologie de Paris*, publishes the following papers of general interest:

On the poisoned arrows of the North American Indians. By G. Lagneau.

Discussion upon Polyandry in Asia—Kachmir and Thibet. Study in ancient and modern ethnography. By O. Beauregard and M. de Ujfalvy.

Anatomical significance of the chief humeral of the biceps muscle. By M. Leo Testut.

On the races of Oceanica. By M. Cauvin.

Report on the brain of Louis Asseline. By MM. Mathias Duval, Chudzinski and Hervé.

Discussion upon the poisoned arrows of the North American Indians. By. MM. Prat and G. de Mortillet.

The traces of ancient religions in Central Asia and to the south of the Hindoo Koosh. By Ch. E. de Ujfalvy.

Morphologic description of the brain of Assezat. By MM. Mathias Duval, Chudzinski and Hervé.

Upon the "Tablier" and steatopygia among the Bushman women. By Dr. Raphael Blanchard.

Human sacrifices among the Khonds of India. By E. Reclus.

The population of Western Laos. By Carl Bock.

Discussion upon the Couvade among the Basques. By J. Vinson and G. Lagneau.

Morphological description of the brain of Coudereau. By MM. Duval, Chudzinski and Hervé.

Influence of alimentation upon the milk. By G. de Mortillet.

The prehistoric Passo. By M. Chauvei.

The most interesting papers of general interest are the reports on the brains of Louis Asseline, M. Assezat and M. Coudereau.

THE CONGRESS OF AMERICANISTS. — In 1875 a gathering of Americanists took place at Nancy, France, and organized the Congrès International des Americanistes, which has assembled by adjournment every two years since that date—once each at Brussels, Luxembourg, Madrid and Copenhagen.

In 1883 the session began at Copenhagen on August 21st. It was opened with all due formality in the magnificent hall of the university, in the presence of the king, the royal family, the Princess of Wales (then on a visit to her parents), the chief ministers of State, and many distinguished visitors and citizens. Official delegates were present from the governments of Denmark, France, Belgium, Spain and Italy, and from learned societies in

Germany, Colombia and the United States, though we regret to say that our own country had only one representative at any time during the congress.

The opening session was presided over by the eminent archæologist, Professor Worsaae, who delivered the address of welcome. He referred to the close relations which Scandinavia and Denmark had maintained, for nearly a thousand years, with Iceland, Greenland and Northern America, described some of the voyages of the Northmen, and called attention to a model of one of their ancient ships which was exhibited in the hall. He was followed by M. Fabie (the delegate from Spain), M. Lucien Adam (from France), and M. Anatole Bamps (from Belgium). The address of the latter gave a brief but masterly sketch of the evidence of the existence of palæolithic man in America, and asked the especial attention of the congress to this subject. Not only, said the speaker, is the testimony now ample that man existed in America at the close of the glacial epoch, but we are even justified in saying that from a comparison of similar discoveries in the two hemispheres, the human race appears to have occupied America at an epoch anterior to any of which we have yet evidence in Asia or Europe.

At the session of the following day, the same topic was brought up by M. Lütken, who described the human remains found in caverns in Brazil by the late Dr. Lund. They were intimately associated with the bones of extinct animals, and gave proof of a high antiquity. M. Reiss, of Berlin, described similar results from his own researches in Brazil and in Buenos Ayres.

A variety of new materials for the history of Columbus's voyages was epitomized by M. Herrera, who has collected a mass of unexpected information from unpublished documents in Spain. Thus, contrary to what has been often stated, he shows that Columbus actually landed on the mainland of the continent at a number of points.

During the second day two papers were presented in English. One was by Mr. Löffler, on the discovery of Vinland by the ancient Scandinavians. He refuted the opinion of the historian Bancroft that the Icelandic *sagas* are without historical value, and argued that Vinland should be located as far south as the State of Virginia. The other paper was by Dr. Brinton, of Philadelphia, one of the vice-presidents of the congress, and the only delegate from the United States. It was a sketch of the literature by native authors in the aboriginal tongues of America.

Another paper in English was read the following day by M. Steenstrup. The subject was the ruins of ancient European colonies which are discovered in unexpected spots in Greenland. No record of these settlements remain beyond obscure allusions in the *sagas*, which have been called in question. But it is evident that a much larger population once existed in that inclement

country than at present, and that the references in the *sagas* are quite trustworthy.

On the 23d, a valuable communication was received from Baron Nordenskjöld. The celebrated navigator had directed that each member of the congress should be presented with an engraved *fac-simile* of a map dating from before the year 1482, on which was represented Greenland and perhaps some outline of the northern portion of the continent. For various reasons, he argued that this map was the production of an Italian who had visited the Faroë islands. This chart and the subject in general were ably discussed at a later hour by M. Steenstrup and Admiral Irminger, who threw much light on the origin of the celebrated "map of Zeno." The extensive voyages through the Northwestern waters by the Northmen were further proved in an excellent paper by M. Brynjulfson. He recited an Icelandic poem of about the year 1100, which describes what is now known as Melville bay, and quoted a letter, still extant, of a priest, giving a narrative of his voyage in 1266 as far as what is now Smith's sound. The descriptions of localities in it are so accurate that they can be readily identified.

How it happened that the really extensive geographical knowledge and profitable fisheries, colonies and commercial relations which the Northmen established with Greenland and vicinity between A. D. 1000 and 1450 became neglected and at last forgotten by themselves, was satisfactorily explained in a long and learned memoir by M. Valdemar Schmidt.

In the domain of archæology, two well-prepared papers on native American ceramics were presented by MM. Bamps and Rada. The former announced the important fact that all varieties and colors of American pottery, from the elaborate workmanship of Peru to the rude efforts of the hunting tribes, are invariably of one uniform *pâte*, not of several different colors or consistencies. Whatever differences there may be due to the mixing of the clay, to the burning, to external coloring, or other such extrinsic treatment. The decoration of native pottery, as well as the theory of aboriginal ornamentation in general, was discussed in an entertaining paper by M. Stolpe.

It has long been known that various savage tribes perform an operation on the skull similar to that called by surgeons "trephining." The occurrence of this in several American nations was described by M. de Baye.

The changes of level in the different parts of the American continent, and their effect on population, were shown by M. Vera, who brought together many striking facts to illustrate the vast geologic oscillations which are in progress.

In American linguistics, the principal contributions were a learned paper by Dr. Rink on the Eskimo tongue, and some remarks on the Kiché and Timucua by other members. The

question of the decipherment of the mysterious hieroglyphs of Yucatan was broached, but it was agreed that little progress had been made in this attractive branch of archæology.

One gratifying fact must be recorded to the credit of those who assisted in this congress. So many antiquaries have made themselves and their study ridiculous by absurd theories, that one always has a dread that this fate will overtake an assemblage of the kind. To be sure, there were a few threatening symptoms of such an outbreak. The Celtomaniac was heard from who wanted to identify some American language with the Welsh, the ancient Atlantis was not wholly submerged out of sight, and the missionary journey of the Apostle St. Thomas to Mexico in A. D. 50 would come up for a little while; but the good sense of the majority soon suppressed these wasters of time.

The occasion was a fine one for practice in languages. The congress has no official tongue, and though most of the proceedings were in French the papers and debates were alternately in that language and in German, English, Spanish and Danish. The sessions closed with an excursion in the picturesque landscapes around Copenhagen, and it is safe to say that every member of the body returned to his home enriched with information on the subject of his studies, and with a sentiment of warm friendliness to the hospitable and intelligent Danish people.

The next meeting of the congress will be at Turin, in 1885.—*D. G. B.*

## MICROSCOPY.[1]

Methods of Preventing the Rolling of Microtomic Sections.—The section-smoother described in the last number of the Naturalist appears to be the best instrument yet devised for the prevention of section-rolling, not excepting the ingenious device of Schulze, described below.

Besides the section-smoother, there are other means by which the rolling of sections may be prevented. It may be effected by rendering the paraffine softer and less elastic through the addition of a small quantity of vaseline, by the aid of brush or spatula held over the object by the left hand during the process of cutting, and lastly—and most effectively—by placing the knife at right angles to the carrier. The discovery of the fact that sections may be cut without rolling by giving the knife a transverse instead of an oblique position, was made by Mr. Caldwell, and at about the same time by Professor Mark. Since the discovery of this method, it has come very rapidly into general use, and now Jung's microtome is supplied with "transverse" as well as "oblique knives." This method, excellent as it is, especially with small objects, does not suffice in all cases, and does not therefore remove the necessity of a section-smoother. Even with the

[1] Edited by Dr. C. O. Whitman, Mus. Comparative Zoology, Cambridge, Mass.

knife placed transversely, the section-smoother may often be used with advantage, and sometimes proves indispensable.

In this method it is important to use a moderately soft paraffine, which may be obtained by mixing, in proper proportions, soft and hard paraffine, and further to give the piece of paraffine to be cut a rectangular form. The piece must then be so placed in the holder that the side next to the knife is exactly parallel with the cutting edge. Thus placed, every section lies flat on the blade. The second section pushes on the first, adhering to its adjoining side; the third pushes on the first two, adhering to the second. A whole ribbon of sections may be cut in this way in a few moments without danger of losing their serial order. Thus three very important points are gained: the sections remain perfectly flat, the cutting may be as rapid as the hand can move, and the order of the sections is preserved without trouble to the manipulator. Care must be taken only that the opposite sides of the paraffine are parallel, otherwise the ribbon will curve to the right or left, and the arrangement of the sections on the slide be less easily accomplished.

SCHULZE'S SECTION-SMOOTHER.[1]—This contrivance consists of a small weight supported by a steel spring. The weight ($w$) which

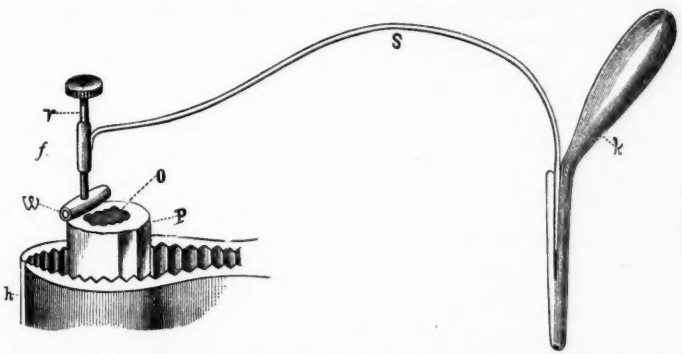



FIG. 1.—Section-smoother adjusted to a block of paraffine ($p$) preparatory to cutting; $o$, the object; $h$, paraffine-holder; $s$, steel spring; $w$, weight.

has the form of a cylinder, is about 8$^{mm}$ in length, and is fixed to the lower end of an upright rod which can be turned about its longer axis, or moved up or down in a ferrule ($f$), as may be seen from the figure. One end of the spring ($s$) supporting the weight is soldered to the ferrule; the other end is held fast in the holder ($k$), one arm of which is prolonged into an enlarged handle-like portion. The holder ($k$)

[1] Franz Eilhard Schulze. Ein Schmittstrecker. *Zool. Anzeiger*, VI, No. 132, p. 100.

fits into a cylindrical hole which penetrates perpendicularly to a depth of 2–3$^{mm}$ the hinder portion of the object-carrier. Within this hole the holder can be turned, or moved up or down; and these movements, together with those which may be given to the rod (*r*) and the spring (*s*), are ample for all adjustments of the weight (*w*).

Preparatory to cutting, the weight should be turned so as to be parallel with the edge of the knife, and raised or lowered by means of the rod (*r*) and the holder (*k*) until it rests *lightly* on the upper surface of the paraffine. Slight changes in the pressure of the weight can be made through the rod (*r*); greater changes can be effected by bending the spring.

The weight should rest, not directly over the object, but on the edge of the paraffine next to the knife.

This section-smoother, which can be fitted to any sliding microtome, can be obtained of Fr. Fasching, in Graz, Bügergasse, No. 13, at a price of 3½ marks, or $0.85.

——:o:——

## SCIENTIFIC NEWS.

— SOME GOSSIP ABOUT DARWIN.—In a recent visit to England, the writer strolled into the village of Down in Kent, and talked with some of the villagers in regard to Mr. Darwin, whose beautiful home is just outside the little town.

Some of this talk, although in itself idle and valueless, may have an interest to readers, as showing how a great man looks to his smaller neighbors.

The landlord of the "George Inn" said that "all the people wished to have Mr. Darwin buried in Down, but the government would not let them. It would have helped the place so much. It would have brought hosts of people down to see his grave. Especially it would have helped the hotel business which is pretty dull in winter time.

"Mr. Darwin was a very fine-looking man. He had a high forehead and wore a long beard. Still, if you had met him on the street, perhaps, you would not have taken much notice of him unless you knew that he was a clever man."

"Sir John Lubbock (Darwin's friend and near neighbor) is a very clever man, too, but not so clever nor so remarkable-looking as Mr. Darwin. He is very fond of hants (ants) and plants and things."

At Keston, three miles from Down, the landlady of the Greyhound had never heard of Mr. Darwin until after his death. There was then considerable talk about his being buried in Westminster, but nothing was said of him before.

Several persons had considerable to say of Mr. Darwin's extensive and judicious charity to the poor. To Mr. Parslow, for

many years his personal servant, Mr. Darwin gave a life pension of £50, and the rent of the handsome "Home Cottage" in Down. During the time of a water famine in that region, he used to ride about on horseback to see who needed water, and had it brought to them at his own expense from the stream at St. Mary's Cray.

"He was," said Mr. Parslow, "a very social, nice sort of a gentleman, very joking and jolly indeed; a good husband and a good father and a most excellent master. Even his footmen used to stay with him as long as five years. They would rather stay with him than take a higher salary somewhere else. The cook came there while young and stayed there till his death, nearly thirty years later.

"Mrs. Darwin is a pleasant lady, a year older than her husband. Their boys are all jolly, nice young fellows. All have turned out so well, not one of them rackety, you know. Seven children out of the ten are now living.

"George Darwin is now a professor in Oxford. He was a barrister at first; had his wig and gown and all, but had to give it up on account of bad health. He would have made a hornament to the profession.

"Francis Darwin is a doctor, and used to work with his father in the greenhouse. He is soon to marry a lady who lectures on Botany in Oxford.

"For the first twenty years after Mr. Darwin's return from South America, his health was very bad—much more than later. He had a stomach disease which resulted from sea-sickness while on the voyage around the world. Mr. Parslow learned the water-cure treatment and treated Mr. Darwin in that system, for a long time, giving much relief.

"Mr. Darwin used to do his own writing but had copyists to get his work ready for the printer. He was always an early man. He used to get up at half past six. He used to bathe and then go out for a walk all around the place. Then Parslow used to get breakfast for him before the rest of the family came down. He used to eat rapidly, then went to his study and wrote till after the rest had breakfast. Then Mrs. Darwin came in and he used to lie half an hour on the sofa while she or some one else read to him. Then he wrote till noon, then went out for an hour to walk. He used to walk all around the place. Later in life, he had a cab, and used to ride on horseback. Then after lunch at one, he used to write awhile. Afterwards he and Mrs. Darwin used to go to the bedroom, where he lay on a sofa and often smoked a cigarette while she read to him. After this he used to walk till dinner-time at five. Before the family grew up, they used to dine early, at half-past one, and had a meat-tea at half-past six.

"Sometimes there were eighteen or twenty young Darwins of different families in the house. Four-in-hand coaches of young

Darwins used sometimes to come down from London. Mr. Darwin liked children. They didn't disturb him in the least. There were sometimes twenty or thirty pairs of little shoes to be cleaned of a morning, but there were always plenty of servants to do this.

"The gardener used to bring plants into his room often of a morning, and he used to tie bits of cotton on them, and try to make them do things. He used to try all sorts of seeds. He would sow them in pots in his study.

"There were a quantity of people in Westminster Abbey when he was buried. Mr. Parslow and the cook were among the chief mourners and sat in the Jerusalem chamber. The whole church was as full of people as they could stand. There was great disappointment in Down that he was not buried there. He loved the place, and we think that he would rather have rested there had he been consulted."—*David S. Jordan, Bloomington, Indiana*

— Sir A. Henry Layard, in his "Nineveh and Babylon" describes a lens which he found in the course of his excavations, and which is now in the British Museum. By the kind permission of Dr. Birch, the keeper of Oriental Antiquities, the Journal of the Royal Microscopical Society has been enabled to figure it. The lens is thus referred to by Sir A. H. Layard: "With the glass bowls was discovered a rock crystal lens, with opposite convex and plane faces. Its properties could hardly have been unknown to the Assyrians, and we have consequently the earliest specimen of a magnifying and burning glass. It was buried beneath a heap of fragments of beautiful blue opaque glass, apparently the enamel of some object in ivory or wood, which had perished.

A note from Sir David Brewster, quoted by Layard, ends as follows: "It is obvious from the shape and rude cutting of the lens that it could not have been intended as an ornament. We are entitled, therefore, to consider it as intended to be used as a lens, either for magnifying or for contracting the rays of the sun, which it does, however, very imperfectly."

— A monograph of the North American fresh-water sponges is now in course of preparation by Mr. Edward Potts. The best season for collecting sponges varies with the different species, but may be generally stated to be from the last of July to the middle or latter part of November, when the spicules and statospheres are likely to be fully matured. They may be preserved in dilute alcohol or dried by a few days' exposure to the air; in which condition Mr. Potts would be very happy to receive specimens from all parts of this and other countries. If packed in light boxes, strong enough to prevent crushing, the postage by mail (4th class) will be but one cent per ounce, which Mr. Potts will gladly repay, with any other reasonable expenses. He will acknowledge their

receipt, giving the names of known species and full credit to the collectors of all that are novel or interesting. Every gathering should be marked with its habitat, the date of collection, and the name and address of the sender. Address specimens and letters to Edward Potts, 228 S. Third street, Philadelphia.

—We are glad to learn, that Dr. Shufeldt of the army is about to resume his scientific work at the Army Medical Museum of Washington. It is the intention of the recently appointed Surgeon-General, General Robert Murray, U. S. Army, to place Dr. Shufeldt in the position he formerly held in that institution, and his duties in that field will commence at an early date.

Dr. Shufeldt has during the year just past made very extensive collections of vertebrates and invertebrates in the southern part of the State of Louisiana. This collection amounted to some 3000 specimens, and coming as they do from a section of our country so little known and worked by the naturalist, they are particularly valuable. It is to be sincerely hoped that Dr. Shufeldt will be enabled to work up his collection, and duly give us a report upon the zoölogy of the section in question.

— Charles Leslie McKay, U. S. Signal Officer at Nushegak, Alaska, was drowned in Bristol bay, last April, while on a collecting excursion. Mr. McKay was engaged in a zoölogical survey of the Bristol Bay region under the auspices of the National Museum, and had already sent in important collections. He was one of the most active of the younger naturalists, having given especial attention to Ichthyology. His only scientific publication is a review of the *Centrarchidæ*, in the Proc. U. S. Nat. Mus. for 1881. This paper was an abridgment of a detailed monograph, the manuscripts of which have been destroyed by the burning of the museum of the Indiana university. Mr. McKay was a native of Wisconsin, a graduate of Indiana university, 26 years of age and unmarried.—*D. S. J.*

— In the recent death of Dr. W. Kowalevsky, palæontological science has lost one of its most able cultivators. He was professor in the University of Moscow, and was of the purest and most advanced Muscovitic stock. His contributions to vertebrate palæontology mostly appeared in the German Palæontographica, and were of a high order of excellence. He anticipated several English and American writers in several generalizations as to the descent of the ungulate Mammalia, among the rest in the genealogy of the horses.

——:o:——

## PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Biological Society of Washington, Nov. 30.—Communications were made by Dr. Frank Baker on the logical method of

teaching anatomy; by Dr. Thomas Taylor on *Oidium tuckeri*, or fungus of the foreign grape vine, with new facts relating to its highest stage of fruit, with illustrations; by Professor Theodore Gill on a new family of deep-sea fishes, the Acanthochænidæ; and by Professor C. V. Riley on the use of naphthaline in medicine and as an insecticide.

NEW YORK ACADEMY OF SCIENCES, Nov. 5.—The relations of Dinichthys, as shown by some recently discovered complete crania, by Dr. John S. Newberry, was the paper for the evening.

Nov. 12.—Dr. Hubbard W. Mitchell delivered a lecture, illustrated with diagrams and stereopticon, upon the succession of animal life on the globe.

Nov. 19.—The following paper was read: Glacial phenomena in the Shawangunk mountains, Dr. Alexis A. Julien.

BOSTON SOCIETY OF NATURAL HISTORY, Nov. 7.—Professor H. W. Haynes spoke of the agricultural implements of the New England Indians; Professor W. O. Crosby read a paper on the origin and relations of continents and ocean-basins; and Dr. M. E. Wadsworth gave brief notes on the lithology of the Island of Jura, Scotland.

Nov. 21.—Mr. William Brewster spoke of the birds observed on the *Arethusa's* cruise to the Gulf of St. Lawrence; and the secretary showed an interesting example of a "home made without hands."

APPALACHIAN MOUNTAIN CLUB, Nov. 14.—Reports of councillors were presented, when the following papers were read: The Reconnaisance of the Carter range, by Miss Edith W. Cook; Crow Nest on the Hudson, by Professor W. W. Bailey; An ascent of the Giant's Stairs, by R. B. Lawrence; A trip over Deception, Dartmouth and Mitten, by George A. Sargent; Mount Parker and Mount Nancy, by Albert Matthews; A visit to the Imp Face, by Miss S. M. Barstow.

At a special meeting, Nov. 20, White Mountain photography was illustrated, by W. H. Pickering; Randolph, by Mrs. L. D. Pychowska; The mountains near Zermatt, illustrated, by C. H. Ames.

A trip to Blue hill was made Saturday, Nov. 10.

AMERICAN GEOGRAPHICAL SOCIETY, Nov. 20.—Mr. George Kennan delivered a lecture entitled, A journey through Southeastern Russia, illustrated with stereopticon views.